

**SEARCH REQUEST FORM****Scientific and Technical Information Center**

Requester's Full Name: AMERIA WILKE Examiner #: BSL63 Date: 6/7/2004  
 Art Unit: 1152 Phone Number 305-272-1331 Serial Number: 10/652,320  
 Mail Box and Bldg/Room Location: REU 07064 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

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Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc., if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Belt Street Attached

Inventors (please provide full names): \_\_\_\_\_

Earliest Priority Filing Date: \_\_\_\_\_

\*For Sequence Searches Only\* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

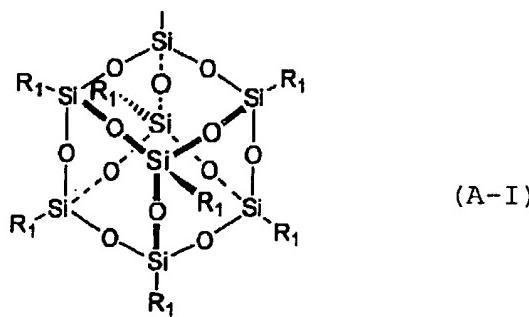
Pure search for a polymer containing a repeating unit of formula (A-7)

and a polymer of claim 2 where you.

<b>STAFF USE ONLY</b>		<b>Type of Search</b>	<b>Vendors and cost where applicable</b>
Searcher:	<u>EZ</u>	NA Sequence (#)	STN <u>\$281.45</u>
Searcher Phone #:	_____	AA Sequence (#)	Dialog _____
Searcher Location:	_____	Structure (#)	(2) (subsets) Questel/Orbit _____
Date Searcher Picked Up:	_____	Bibliographic	(and) Dr. Link _____
Date Completed:	<u>6-8-04</u>	Litigation	Lexis/Nexis _____
Searcher Prep & Review Time:	<u>10</u>	Fulltext	Sequence Systems _____
Clerical Prep Time:	_____	Patent Family	WWW/Internet _____
Online Time:	<u>80</u>	Other	Other (specify) _____

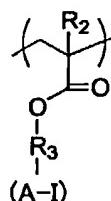
WHAT IS CLAIMED IS:

1. An intermediate layer material composition for a multilayer resist process, comprising (A) a polymer containing a repeating unit having on a side chain thereof a group represented by the following general formula (A-I):

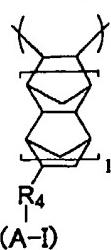


wherein R<sub>1</sub> represents an alkyl group, an alkoxy group, an aryl group, an aralkyl group, a cyclopentyl group or a cyclohexyl group; a plurality of R<sub>1</sub>'s each may be the same or different.

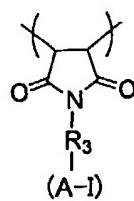
2. The intermediate layer material composition described in claim 1, wherein the polymer is a polymer having at least one of repeating units represented by the following general formulas (a-1) to (a-4):



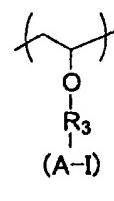
(a-1)



(a-2)



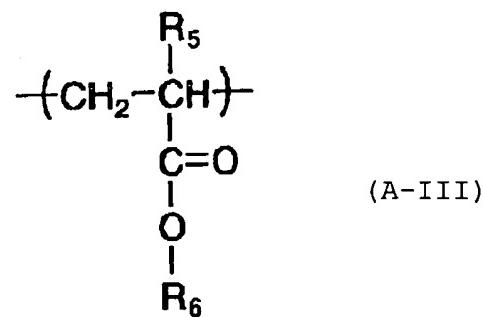
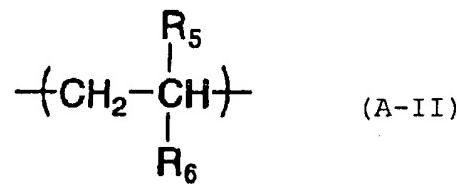
(a-3)



(a-4)

wherein (A-I) represents the group represented by the general formula (A-I) described in claim 1; R<sub>2</sub> represents a hydrogen atom or a methyl group; R<sub>3</sub> represents an alkylene group or a phenylene group; R<sub>4</sub> represents an alkylene group, a phenylene group or -C(=O)-O-R'-; R' represents an alkylene group.

3. The intermediate layer material composition described in claim 1, wherein the polymer further contains at least one of a repeating unit represented by the following general formula (A-II) and a repeating unit represented by the following general formula (A-III):



wherein R<sub>5</sub> represents a hydrogen atom or a methyl group; R<sub>6</sub> represents an aryl group or an aralkyl group.

4. The intermediate layer material composition

'described in claim 1, wherein the polymer contains the repeating unit having on a side chain thereof the group represented by the following general formula (A-I) in an amount of 3 to 90 mol%.

5. The intermediate layer material composition described in claim 1, which further comprises (B) a crosslinking agent.

6. The intermediate layer material composition described in claim 5, wherein the crosslinking agent (B) is a phenol derivative having a molecular weight of 1,200 or less, containing 3 to 5 benzene rings in its molecule, and having 2 or more hydroxymethyl groups or alkoxyethyl groups in total, wherein the hydroxymethyl groups or alkoxyethyl groups bind to the benzene rings.

7. The intermediate layer material composition described in claim 1, which further comprises (C) a compound capable of generating an acid by heat.

8. The intermediate layer material composition described in claim 1, which further comprises (D) a solvent.

9. The intermediate layer material composition

described in claim 1, which further comprises (E) a surfactant.

10. A process for forming a resist pattern, which comprises:

forming on a substrate a lower resist layer comprising an organic material;

forming on the lower resist layer an intermediate layer using the intermediate layer material composition described in claim 1;

forming on the intermediate layer an upper resist layer comprising an organic material crosslinkable or decomposable by a radiation exposure;

forming a predetermined pattern on the upper resist layer; and

etching the intermediate layer, the lower resist layer and the substrate, sequentially.

11. The process described in claim 10, wherein the intermediate layer is formed by coating the intermediate layer material composition described in claim 1 on the lower resist layer, and then baking the coating to be insolubilized in an organic solvent.

12. The process described in claim 11, wherein the coating is baked at a temperture of 150 to 250°C.

13. The process described in claim 10, wherein the lower resist layer has a thickness of 0.1 to 4.0  $\mu\text{m}$ .

14. The process described in claim 10, wherein the intermediate layer has a thickness of 0.02 to 0.6  $\mu\text{m}$ .

15. The process described in claim 10, wherein the upper layer has a thickness of 0.03 to 0.6  $\mu\text{m}$ .

10/652320                      Examiner: WALKE, AMANDA                      GAU: 1752  
Classification: 430/270.100              Inventor: UENISHI , KAZUYA, et al  
Status: 30 - DOCKETED NEW CASE - READY FOR EXAMINATION  
Title: INTERMEDIATE LAYER MATERIAL COMPOSITION FOR MULTILAYER RESIST PROCESS AND PATTE...

Bib Data report

**Application Title:**INTERMEDIATE LAYER MATERIAL COMPOSITION FOR  
MULTILAYER RESIST PROCESS AND PATTERN FORMATION PROCESS USING  
THE SAME

**Application Num:**  (in phx) 10652320      **Filing Date:**09/02/2003

**Effective Filing:**09/02/2003

(Location History)    (Foreign/Continuity Data)

**Status:** 30/DOCKETED NEW CASE - READY FOR EXAMINATION    **Status Date:**  
05/06/2004

**Patent Number:** Not Issued    **Issue Date:** N/A    **Date of Abandonment:** N/A  
**Confirmation Number:**1733    **PALM Location:**

**Examiner:** 75663    WALKE, AMANDA (Assignment Data)    **Group Art Unit:**1752  
**Class/Subclass:** 430/270.100

**State or Country:**JAPAN    **Sheets/Drawing:**0    **Total Claims:**15    **Independent Claims:**1



**Inventors:**

<b>Last name, First name:</b>	<b>City:</b>	<b>Country or State:</b>
UENISHI, KAZUYA	SHIZUOKA	JAPAN
SATO, KENICHIRO	SHIZUOKA	JAPAN

**Attorneys:** ALL    **Attorney Docket No:**Q77235

**Interference No:**    **Lost Case:**No    **Unmatched Petition:**No    **L&R Code:**1

=> file reg  
FILE 'REGISTRY' ENTERED AT 13:36:26 ON 08 JUN 2004  
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FILE 'LREGISTRY' ENTERED AT 13:13:57 ON 08 JUN 2004  
L1 0 S 20/RACT  
L2 489 S 20/RATC  
L3 38 S O SI/RELF  
L4 0 S L2 AND L3

FILE 'REGISTRY' ENTERED AT 13:16:40 ON 08 JUN 2004  
L5 103221 S L2  
L6 10108 S L3  
L7 1168 S L5 AND L6  
L8 261 S L7 AND PMS/CI

FILE 'HCA' ENTERED AT 13:20:51 ON 08 JUN 2004  
L9 168 S L8  
L10 148917 S RESIST OR RESISTS OR PHOTORESIST? OR MASK? OR PHOTOMASK  
L11 18 S L9 AND L10

FILE 'REGISTRY' ENTERED AT 13:22:06 ON 08 JUN 2004  
E POLYACRYLIC/PCT  
L12 292075 S E3

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E NORBORNENE/CN  
L13 1 S E3  
L14 465 S 103.10/RID  
E SUCCINIMIDE/CN  
L15 1 S E3  
L16 2642 S 16.136/RID  
E POLYVINYL/PCT

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E POLYVINYL/PCT  
L17 165314 S E3  
L18 74 S L8 AND L12  
L19 12 S L8 AND L14  
L20 4 S L8 AND L16  
L21 57 S L8 AND L17

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L22           4 S L20  
L23           20 S L19  
L24           45 S L21  
L25           38 S L18  
L26           4 S L22 NOT L11  
L27           20 S L23 NOT (L11 OR L26)  
L28           23 S L25 NOT (L11 OR L26 OR L27)  
L29           30 S L24 NOT (L11 OR L26 OR L27 OR L28)

=> file hca

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L11 ANSWER 1 OF 18 HCA COPYRIGHT 2004 ACS on STN

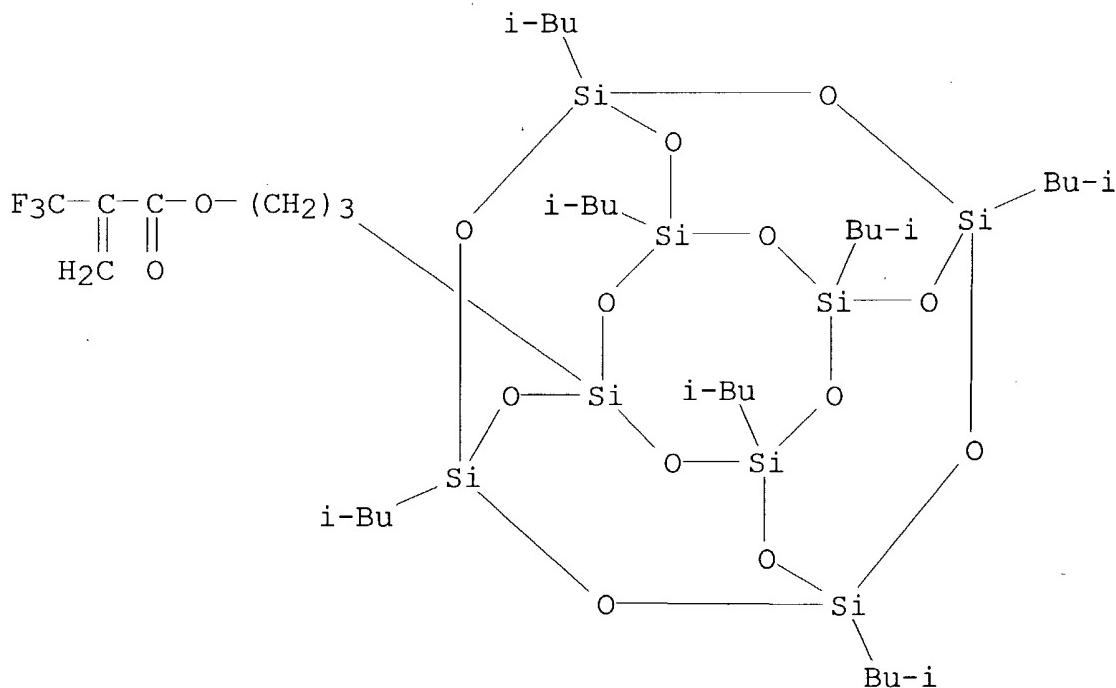
140:365500 Fluoropolymer **resists** for 157 nm lithography.

Vohra, Vaishali R.; Liu, Xiang-Qian; Douki, Katsuji; Ober, Christopher K.; Conley, Will; Zimmerman, Paul; Miller, Daniel (Department of Materials Science & Engineering, Cornell Univ., Ithaca, NY, 14853, USA). Proceedings of SPIE-The International Society for Optical Engineering, 5039(Pt. 1, Advances in Resist Technology and Processing XX), 539-547 (English) 2003. CODEN: PSISDG. ISSN: 0277-786X. Publisher: SPIE-The International Society for Optical Engineering.

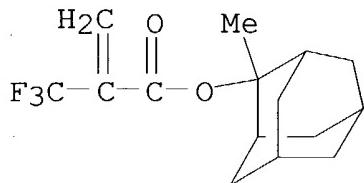
AB Fluoropolymers have been shown to be one of the best materials for high transparency of 157 nm wavelength radiation. Both **resists** and pellicles are being designed from such materials. One of the authors approaches to improved transparency for 157 nm **resists** is based upon fluorinated variations of polymethacrylate and polyhydroxystyrene derivs. Lithog. studies were carried out on exptl. **resist** platforms using 157 and 248 nm steppers, and it was shown that, after selective modification, it is possible to use conventional **resist** backbones, such as acrylic or styrenic, in the design of single-layer **resists** for 157 nm lithog. It has been demonstrated in the authors studies that 157 nm absorbance of these materials can be as low as 1.5-2.0  $\mu\text{m}^{-1}$ . Another approach to 157 nm **resist** design is based upon fluorinated backbone variations. Research will be described focusing on several new monomers having fluorine functions such as -F and -CF<sub>3</sub> groups near a polymerizable double bond to improve transparency at 157 nm and to raise the **resist** glass transition temp. compared to their

hydrocarbon analogs. Due to the lower electron d. of the double bond, these monomers can be copolymerd. with electron-rich vinyl monomers. As an extension to this strategy, the authors are synthesizing novel fluoropolymers having partially fluorinated monocyclic structures with radical cyclo-polymn. These polymers have the C-F bond on the polymer main chain and also possess acid labile groups as part of a ring structure to eliminate degassing. In order to further enhance the transparency of these systolic polymers at 157 nm, we have eliminated the carbonyl group. The cyclic nature of the polymer will result in a high glass transition temp.

IT 681235-91-6 681235-95-0  
 (design of fluoropolymers for single-layer chem. amplification photoresists for 157 nm lithog.)  
 RN 681235-91-6 HCA  
 CN 2-Propenoic acid, 2-(trifluoromethyl)-, 3-[heptakis(2-methylpropyl)pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl]propyl ester, polymer with 2-methyltricyclo[3.3.1.13,7]dec-2-yl 2-(trifluoromethyl)-2-propenoate (9CI) (CA INDEX NAME)  
 CM 1  
 CRN 681235-60-9  
 CMF C35 H71 F3 O14 Si8

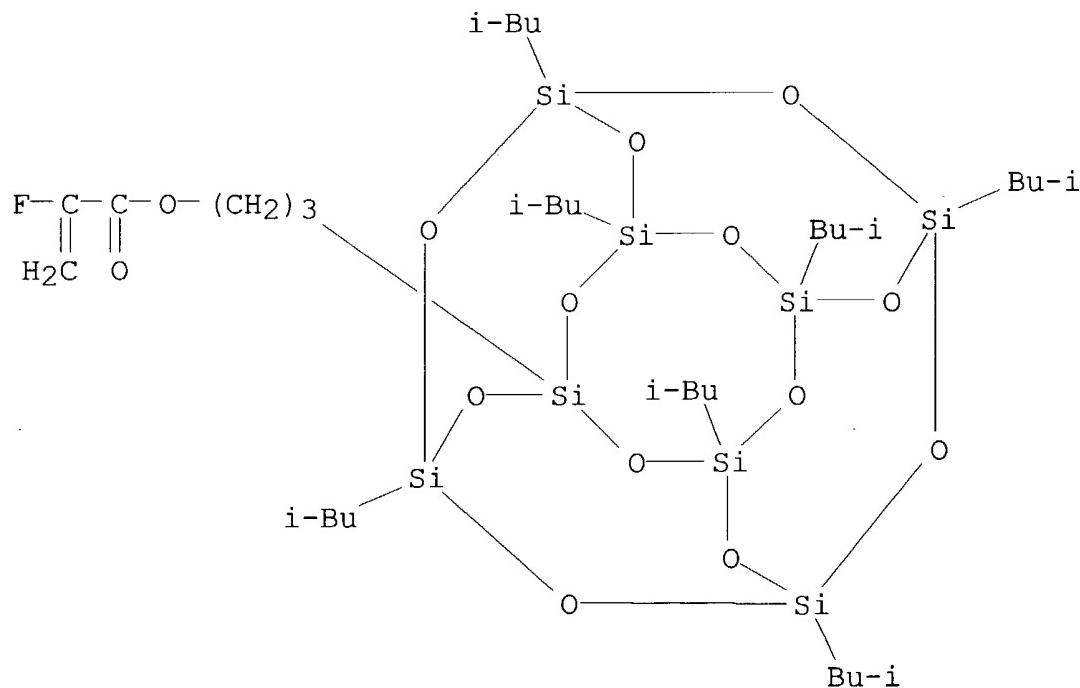


CM 2

CRN 188739-86-8  
CMF C15 H19 F3 O2

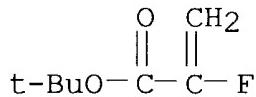
RN 681235-95-0 HCA  
 CN 2-Propenoic acid, 2-fluoro-, polymer with 1,1-dimethylethyl 2-fluoro-2-propenoate and 3-[heptakis(2-methylpropyl)pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl]propyl 2-fluoro-2-propenoate (9CI) (CA INDEX NAME)

CM 1

CRN 681235-66-5  
CMF C34 H71 F O14 Si8

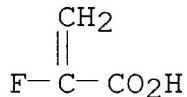
CM 2

CRN 85345-86-4  
CMF C7 H11 F O2



CM 3

CRN 430-99-9  
CMF C3 H3 F O2



- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)  
ST vacuum UV chem amplification **photoresist** fluoropolymer  
IT Optical absorption  
    (design and lithog. properties of fluoropolymers for single-layer chem. amplification **photoresist** formulations for 157 nm exposures)  
IT Fluoropolymers, properties  
    (design and lithog. properties of fluoropolymers for single-layer chem. amplification **photoresist** formulations for 157 nm exposures)  
IT Silsesquioxanes  
    (fluorine-contg.; design and lithog. properties of fluoropolymers for single-layer chem. amplification **photoresist** formulations for 157 nm exposures)  
IT Fluoropolymers, properties  
    (silsesquioxane-; design and lithog. properties of fluoropolymers for single-layer chem. amplification **photoresist** formulations for 157 nm exposures)  
IT **Photoresists**  
    (vacuum-UV, chem. amplified; design and lithog. properties of fluoropolymers for single-layer chem. amplification **photoresist** formulations for 157 nm exposures)  
IT 681235-86-9P  
    (design and lithog. properties of fluoropolymers for single-layer chem. amplification **photoresist** formulations for 157 nm exposures)  
IT 479072-90-7P 681235-75-6P

(design and lithog. properties of fluoropolymers for single-layer chem. amplification **photoresist** formulations for 157 nm exposures)

- IT 681235-70-1P  
 (design and properties of fluoropolymers for single-layer chem. amplification **photoresist** formulations for 157 nm exposures)
- IT 681235-91-6 681235-95-0  
 (design of fluoropolymers for single-layer chem. amplification **photoresists** for 157 nm lithog.)
- IT 75-59-2, Tetramethylammonium hydroxide 1116-76-3, Trioctylamine (developer; design and lithog. properties of fluoropolymers for single-layer chem. amplification **photoresist** formulations for 157 nm exposures)
- IT 85345-86-4P 479072-81-6P 635683-21-5P 681235-55-2P  
 681235-60-9P 681235-66-5P  
 (monomer; design of fluoropolymers for single-layer chem. amplification **photoresists** for 157 nm lithog.)
- IT 144317-44-2, Triphenylsulfonium perfluoro-1-butanesulfonate (photoacid generator; design and lithog. properties of fluoropolymers for single-layer chem. amplification **photoresist** formulations for 157 nm exposures)

L11 ANSWER 2 OF 18 HCA COPYRIGHT 2004 ACS on STN  
 140:347501 Silicon-containing acrylic compounds for **resists** showing high far-UV transparency and good plasma resistance. Fukui, Toshimi; Obata, Kuninori; Doi, Motoyuki; Kondo, Osamu (Kansai Research Institute Inc., Japan; Mitsubishi Gas Chemical Co., Ltd.). Jpn. Kokai Tokkyo Koho JP 2004115460 A2 20040415, 12 pp.  
 (Japanese). CODEN: JKXXAF. APPLICATION: JP 2002-282850 20020927.

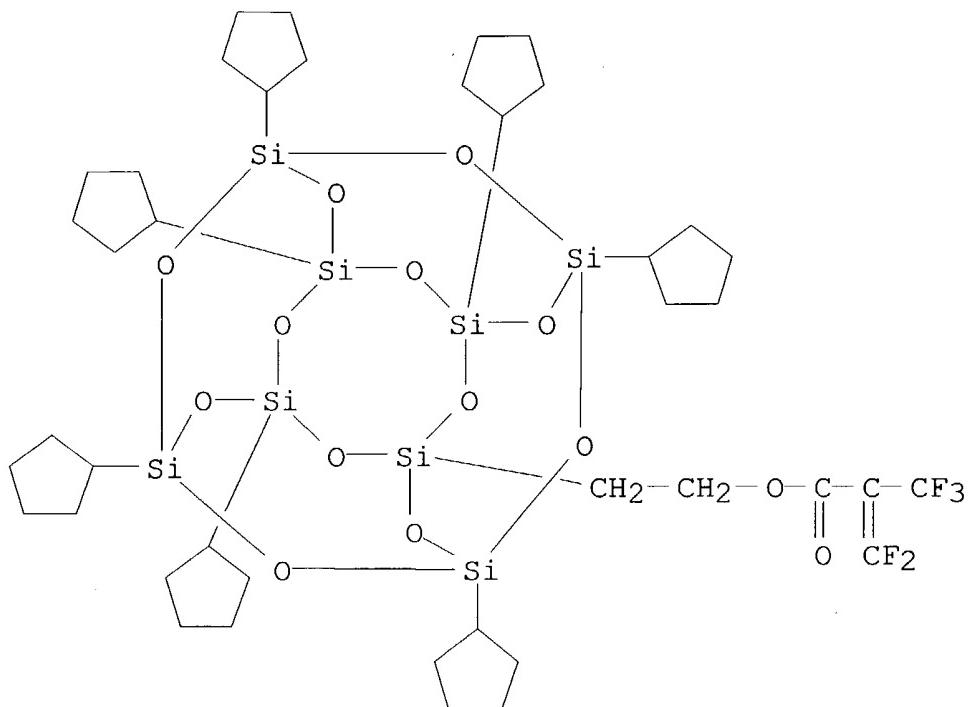
AB The compds. are RR<sub>4</sub>O<sub>2</sub>CCR<sub>1</sub>:CR<sub>2</sub>R<sub>3</sub> [R<sub>1</sub>-R<sub>3</sub> = H, F, C<sub>1</sub>-20 (cyclo)alkyl; R<sub>4</sub> = C<sub>1</sub>-20 (cyclo)alkylene; R = Si-contg. group]. Preferably, R are silsesquioxane groups R<sub>5</sub>(SiO<sub>3</sub>/2)<sub>m</sub>(SiO<sub>3</sub>/2) [R<sub>5</sub> = H, F, C<sub>1</sub>-20 (cyclo)alkyl, C<sub>1</sub>-20 fluoroalkyl; m = 7-19] or polysilane groups R<sub>8</sub>(SiR<sub>6</sub>R<sub>7</sub>)<sub>n</sub> [R<sub>6</sub>-R<sub>8</sub> = H, C<sub>1</sub>-20 (cyclo)alkyl, C<sub>1</sub>-20 fluoroalkyl; n = 2-20].

IT 679817-45-9P  
 (manuf. of Si-contg. acrylic compds. for **resists** showing high far-UV transparency and good plasma resistance)

RN 679817-45-9 HCA  
 CN 2-Propenoic acid, 3,3-difluoro-2-(trifluoromethyl)-, 2-(heptacyclopentylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)ethyl ester, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 679817-44-8  
 CMF C41 H67 F5 O14 Si8



IC ICM C07F007-08  
 ICS C07F007-21; C08G077-20; C08G077-60; G03F007-075; C08F030-08

CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

Section cross-reference(s): 29, 35, 38

ST silicon acrylate far UV **resist** plasma resistance;  
 silsesquioxane acrylate far UV **resist** plasma resistance;  
 polysilane acrylate far UV **resist** plasma resistance

IT **Photoresists**

(UV, far-UV; manuf. of Si-contg. acrylic compds. for **resists** showing high far-UV transparency and good plasma resistance)

IT 679817-45-9P 679817-47-1P

(manuf. of Si-contg. acrylic compds. for **resists** showing high far-UV transparency and good plasma resistance)

IT 1068-55-9, Isopropylmagnesium chloride 4245-37-8, Vinyl methacrylate 4518-98-3 18204-80-3, 2-Acetoxyethyltrichlorosilane 183387-28-2 679817-43-7

(manuf. of Si-contg. acrylic compds. for **resists** showing high far-UV transparency and good plasma resistance)

L11 ANSWER 3 OF 18 HCA COPYRIGHT 2004 ACS on STN

140:261284 The challenges of 157 nm nanolithography: surface morphology of silicon-based copolymers. Sarantopoulou, E.; Kollia, Z.;

Kocevar, K.; Musevic, I.; Kobe, S.; Drazic, G.; Gogolides, E.; Argitis, P.; Cefalas, A. C. (Theoeritical and Phys. Chem. Inst., National Hellenic Research Foundation, Athens, 11635, Greece). Materials Science & Engineering, C: Biomimetic and Supramolecular Systems, C23(6-8), 995-999 (English) 2003. CODEN: MSCEEE. ISSN: 0928-4931. Publisher: Elsevier Science B.V..

AB Lithog. at 157 nm using F2 laser is the next step after 193 nm for ULSI fabrication with dimensions below 50 nm. However, there are problems related to the development of the 157 nm technol., the most important being the design of **photoresists** with suitable absorption at 157 nm and low outgassing. On the other hand, high-resoln. capabilities of **resist** depend on the surface roughness and its modification following 157 nm illumination of the **resist**. In this communication, a copolymer of ethyl-polyhedral oligomeric silsesquioxane (ethyl-POSS) and tert-Bu methacrylate (TBMA) was evaluated for surface homogeneity, before and after exposure to 157 nm at different concns. of the homopolymers. Surface roughness depends on the chem. compn. of the **resist**, and at. force microscope (AFM) images of exposed areas indicate accumulation of matter at the edge of the boundaries between exposed and non-exposed areas.

IT 509106-75-6

(evaluation of ethyl-polyhedral oligomeric silsesquioxane-tert-Bu methacrylate copolymer for 157 nm lithog.)

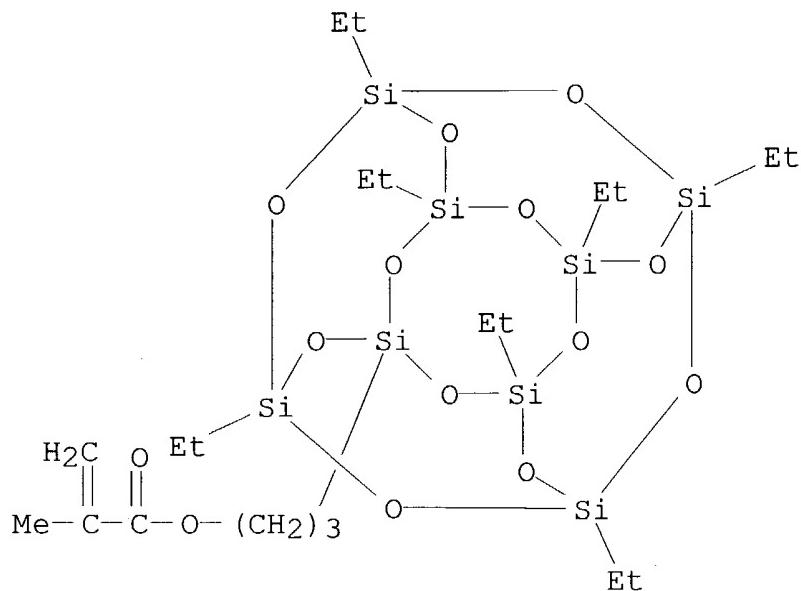
RN 509106-75-6 HCA

CN 2-Propenoic acid, 2-methyl-, 1,1-dimethylethyl ester, polymer with 3-(heptaethylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

CM 1

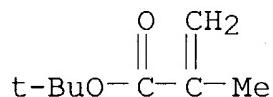
CRN 509106-74-5

CMF C21 H46 O14 Si8



CM 2

CRN 585-07-9  
 CMF C8 H14 O2



- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)  
 ST surface morphol silicon based copolymer **photoresist** vacuum UV photolithog; ethyl silsesquioxane butyl methacrylate copolymer **photoresist** surface roughness  
 IT **Photoresists**  
     (vacuum-UV; evaluation of ethyl-polyhedral oligomeric silsesquioxane-tert-Bu methacrylate copolymer for 157 nm lithog.)  
 IT 509106-75-6  
     (evaluation of ethyl-polyhedral oligomeric silsesquioxane-tert-Bu methacrylate copolymer for 157 nm lithog.)

L11 ANSWER 4 OF 18 HCA COPYRIGHT 2004 ACS on STN  
 140:261279 Polyhedral oligomeric silsesquioxane (POSS) based **resist** materials for 157-nm lithography. Tegou, Evangelia; Bellas, Vassilios; Gogolides, Evangelos; Argitis, Panagiotis; Dean,

Kim R.; Eon, David; Cartry, Gilles; Cardinaud, Christophe (Institute of Microelectronics, Aghia Paraskevi, 15310, Greece). Proceedings of SPIE-The International Society for Optical Engineering, 5039(Pt. 1, Advances in Resist Technology and Processing XX), 453-461 (English) 2003. CODEN: PSISDG. ISSN: 0277-786X. Publisher: SPIE-The International Society for Optical Engineering.

AB Novel polymers contg. polyhedral oligomeric silsesquioxane (POSS) pendant groups have been synthesized and evaluated as components of 157 nm **resist** formulations. Random copolymers of polymerizable, ethyl-POSS contg. monomers with various acrylates, including tert-Bu methacrylates, were first used in pos., aq. base-developable **resist** formulations and evaluated at thicknesses in the range of 100 nm. Copolymers with optimized monomer compn. do not present strong self-organization phenomena and provide materials with good film forming properties, and high sensitivity at 157 nm (1-10 mJ/cm<sup>2</sup> under open field exposure). Process studies reveal strong influence of thermal processing conditions and development concns. on swelling of unexposed and underexposed **resist** areas. Similar results are obtained from Dissoln. Rate Monitoring (DRM) studies. A typical process selected for selling redn. includes pre-exposure and post-exposure bakes at 160° C (2 min) and selection of low strength developers. High resoln. patterning under these conditions has shown potential for sub 130 nm lithog. upon further material optimization. On the other hand, pattern transfer studies have shown that 100 nm thick films of POSS contg. materials, having the same silicon content as the ones evaluated for high resoln. 157 nm lithog., provide the necessary oxygen plasma resistance for use as bilayer **resists**. XPS was used for surface characterization before plasma etching. Both XPS and angular XPS characterization have revealed that the POSS moieties tend to segregate preferentially on the free surface of the films.

IT 632330-71-3 632330-72-4

(evaluation of polymers contg. polyhedral oligomeric silsesquioxane pendant groups as components of 157 nm chem. amplified **photoresist** formulations)

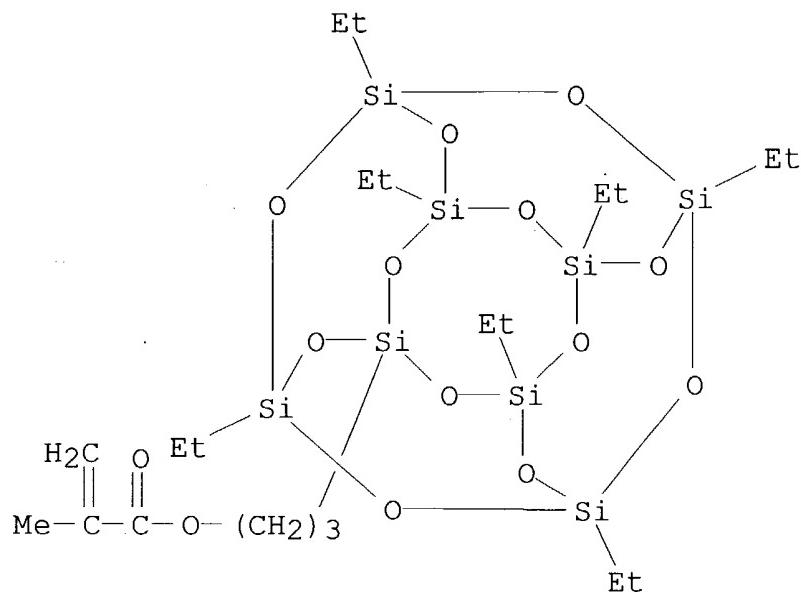
RN 632330-71-3 HCA

CN 2-Propenoic acid, 2-methyl-, polymer with 1,1-dimethylethyl 2-methyl-2-propenoate and 3-(heptaethylpentacyclo[9.5.1.13,9.15,15.1,7,13]octasiloxanyl)propyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

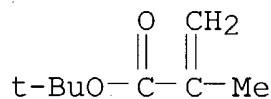
CM 1

CRN 509106-74-5

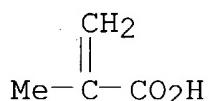
CMF C21 H46 O14 Si8



CM 2

CRN 585-07-9  
CMF C<sub>8</sub> H<sub>14</sub> O<sub>2</sub>

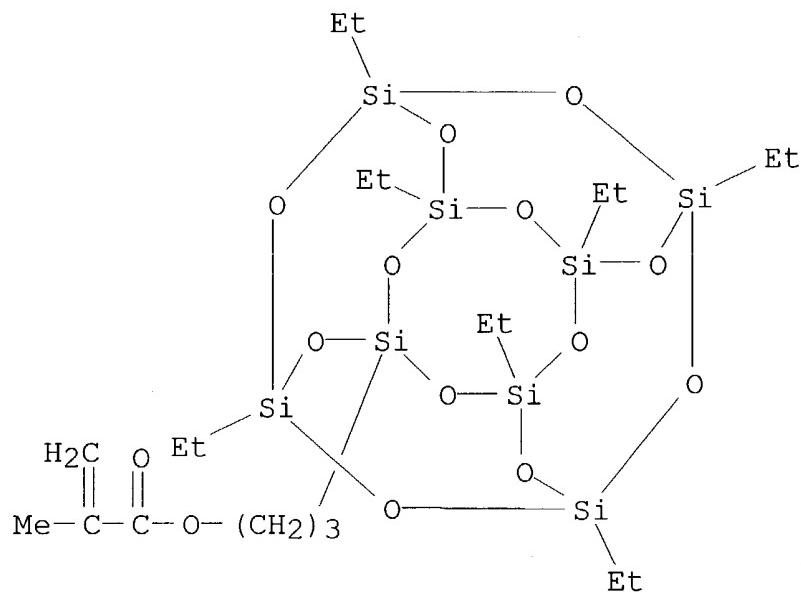
CM 3

CRN 79-41-4  
CMF C<sub>4</sub> H<sub>6</sub> O<sub>2</sub>

RN 632330-72-4 HCA  
 CN 2-Propenoic acid, 2-methyl-, polymer with dihydro-3-methylene-2,5-furandione, 1,1-dimethylethyl 2-methyl-2-propenoate and 3-(heptaethylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

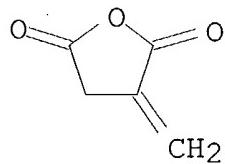
CM 1

CRN 509106-74-5  
 CMF C21 H46 O14 Si8



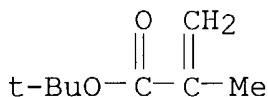
CM 2

CRN 2170-03-8  
 CMF C5 H4 O3

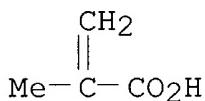


CM 3

CRN 585-07-9  
 CMF C8 H14 O2



CM 4

CRN 79-41-4  
CMF C4 H6 O2

- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST polyhedral oligomeric silsesquioxane group contg polymer **photoresist** vacuum UV
- IT X-ray photoelectron spectra  
(evaluation of polymers contg. polyhedral oligomeric silsesquioxane pendant groups as components of 157 nm chem. amplified **photoresist** formulations)
- IT Silsesquioxanes  
(fluorine-contg., methacrylate-; evaluation of polymers contg. polyhedral oligomeric silsesquioxane pendant groups as components of 157 nm chem. amplified **photoresist** formulations)
- IT Silsesquioxanes  
(methacrylate-; evaluation of polymers contg. polyhedral oligomeric silsesquioxane pendant groups as components of 157 nm chem. amplified **photoresist** formulations)
- IT Etching  
(plasma; evaluation of polymers contg. polyhedral oligomeric silsesquioxane pendant groups as components of 157 nm chem. amplified **photoresist** formulations)
- IT Fluoropolymers, properties  
(silsesquioxane-, methacrylate-; evaluation of polymers contg. polyhedral oligomeric silsesquioxane pendant groups as components of 157 nm chem. amplified **photoresist** formulations)
- IT **Photoresists**  
(vacuum-UV, chem. amplified; evaluation of polymers contg. polyhedral oligomeric silsesquioxane pendant groups as components of 157 nm chem. amplified **photoresist** formulations)
- IT 632330-71-3 632330-72-4  
(evaluation of polymers contg. polyhedral oligomeric silsesquioxane pendant groups as components of 157 nm chem.

IT amplified photoresist formulations)  
7782-44-7, Oxygen, uses  
(plasma; evaluation of polymers contg. polyhedral oligomeric silsesquioxane pendant groups as components of 157 nm chem.  
amplified photoresist formulations)

L11 ANSWER 5 OF 18 HCA COPYRIGHT 2004 ACS on STN  
140:101908 A new nanocomposite **resist** for low and high voltage electron beam lithography. Azam Ali, M.; Gonsalves, Kenneth E.; Agrawal, Ankur; Jeyakumar, Augustin; Henderson, Clifford L. (Department of Chemistry and Cameron Applied Research Center, Polymer Chemistry NanoTechnology Laboratory, The University of North Carolina-Charlotte (UNCC), Charlotte, NC, 28223, USA). Microelectronic Engineering, 70(1), 19-29 (English) 2003. CODEN: MIENEF. ISSN: 0167-9317. Publisher: Elsevier Science B.V..

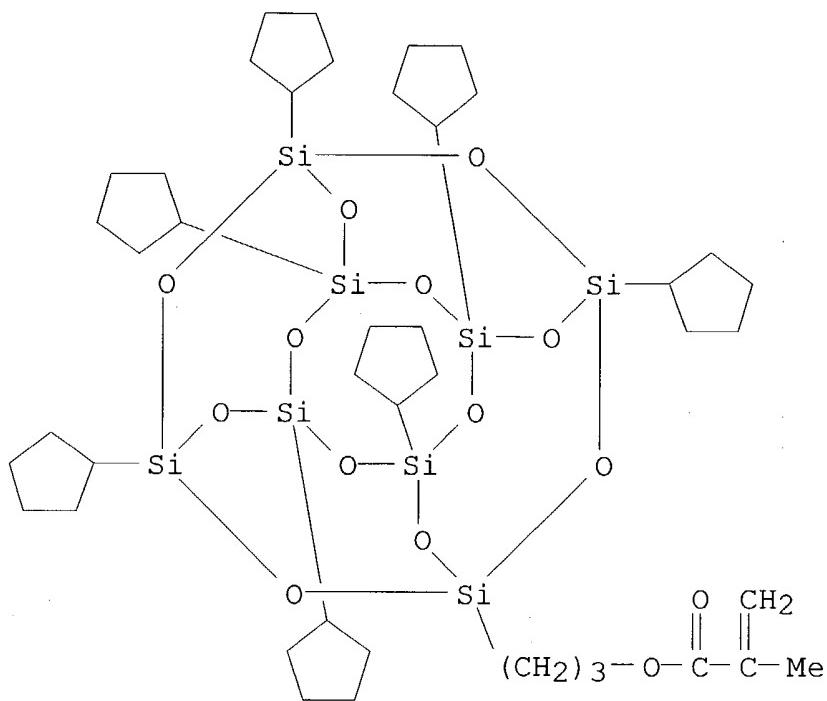
AB A novel nanocomposite **photoresist** was synthesized and characterized for use in both low and high voltage electron-beam lithog. This **resist** system is shown to display the ideal combination of both enhanced etch resistance and enhanced sensitivity required to satisfy both low and high voltage patterning applications. **Resist** sensitivity was enhanced by the direct incorporation of a photoacid generating monomer into the **resist** polymer backbone while the etch resistance of the material was improved by copolyrn. with polyhedral oligo silsesquioxane methacrylate monomer.

IT 461699-74-1  
(lithog. properties of nanocomposite **resist** contg. both photoacid generator and silicon-contg. groups in polymer chain for low- and high voltage electron-beam exposures)

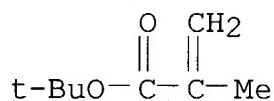
RN 461699-74-1 HCA  
CN Sulfonium, dimethyl[4-[(2-methyl-1-oxo-2-propenyl)oxy]phenyl]-, salt with trifluoromethanesulfonic acid (1:1), polymer with 1,1-dimethylethyl 2-methyl-2-propenoate, 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate, methyl 2-methyl-2-propenoate and 2-methyl-2-propenoic acid (9CI) (CA INDEX NAME)

CM 1

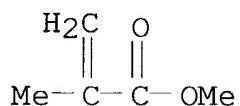
CRN 169391-91-7  
CMF C42 H74 O14 Si8



CM 2

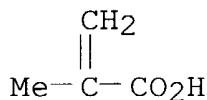
CRN 585-07-9  
CMF C8 H14 O2

CM 3

CRN 80-62-6  
CMF C5 H8 O2

CM 4

CRN 79-41-4  
CMF C4 H6 O2

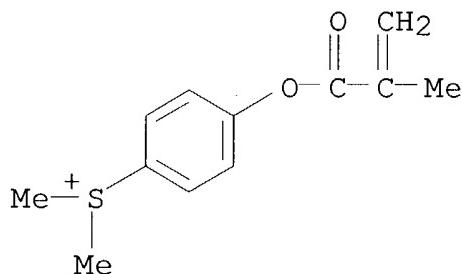


CM 5

CRN 352455-54-0  
CMF C12 H15 O2 S . C F3 O3 S

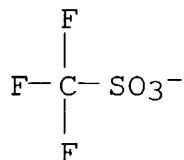
CM 6

CRN 141718-72-1  
CMF C12 H15 O2 S



CM 7

CRN 37181-39-8  
CMF C F3 O3 S



CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

ST electron beam lithog chem amplification pos nanocomposite **resist**; photoacid generator group silsesquioxane methacrylate polymer electron **resist**

- IT Surface roughness  
(lithog. properties of nanocomposite **resist** contg. both photoacid generator and silicon-contg. groups in polymer chain for low- and high voltage electron-beam exposures)
- IT Silsesquioxanes  
(lithog. properties of nanocomposite **resist** contg. both photoacid generator and silicon-contg. groups in polymer chain for low- and high voltage electron-beam exposures)
- IT Etching  
(plasma, reactive ion; lithog. properties of nanocomposite **resist** contg. both photoacid generator and silicon-contg. groups in polymer chain for low- and high voltage electron-beam exposures)
- IT Etching kinetics  
(plasma; lithog. properties of nanocomposite **resist** contg. both photoacid generator and silicon-contg. groups in polymer chain for low- and high voltage electron-beam exposures)
- IT Electron beam **resists**  
(pos.-working, chem. amplified; lithog. properties of nanocomposite **resist** contg. both photoacid generator and silicon-contg. groups in polymer chain for low- and high voltage electron-beam exposures)
- IT Thickness  
X-ray **resists**  
(x-ray sensitivity of nanocomposite **resist** contg. both photoacid generator and silicon-contg. groups in polymer chain for electron-beam exposures)
- IT 75-59-2, Tetramethylammonium hydroxide  
(developer; lithog. properties of nanocomposite **resist** contg. both photoacid generator and silicon-contg. groups in polymer chain for low- and high voltage electron-beam exposures)
- IT 461699-74-1  
(lithog. properties of nanocomposite **resist** contg. both photoacid generator and silicon-contg. groups in polymer chain for low- and high voltage electron-beam exposures)
- IT 75-46-7, Trifluoromethane 7782-44-7, Oxygen, uses  
(plasma; lithog. properties of nanocomposite **resist** contg. both photoacid generator and silicon-contg. groups in polymer chain for low- and high voltage electron-beam exposures)
- IT 7631-86-9, Silica, uses  
(substrate; lithog. properties of nanocomposite **resist** contg. both photoacid generator and silicon-contg. groups in polymer chain for low- and high voltage electron-beam exposures)

L11 ANSWER 6 OF 18 HCA COPYRIGHT 2004 ACS on STN

140:33667 Lithographic materials based on polymers containing polyhedral oligomeric silsesquioxanes. Gogolides, Evangelos; Argitis, Panagiotis; Bellas, Vasilius; Tegou, Evangelia (National Center for

Scientific Research 'Demokritos', Greece). PCT Int. Appl. WO 2003102695 A1 20031211, 16 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2003-GR18 20030530. PRIORITY: GR 2002-100253 20020530.

AB Title lithog. materials, suitable for optical lithog. in the UV region (including 157 nm and extreme UV region), and for electron beam lithog., are based on polymers characterized by having polyhedral oligomeric silsesquioxanes in their mol. Et, or similar or smaller size, groups are used as alkyl substituents of the silsesquioxanes in order to reduce problems related to pattern transfer, roughness, and high absorbance at 157 nm (such problems occur when the substituents are large alkyl groups such as cyclopentyl groups).

IT 169699-57-4 509106-75-6 632330-68-8  
632330-69-9 632330-70-2 632330-71-3  
632330-72-4

(lithog. materials based on polymers contg. polyhedral oligomeric silsesquioxanes)

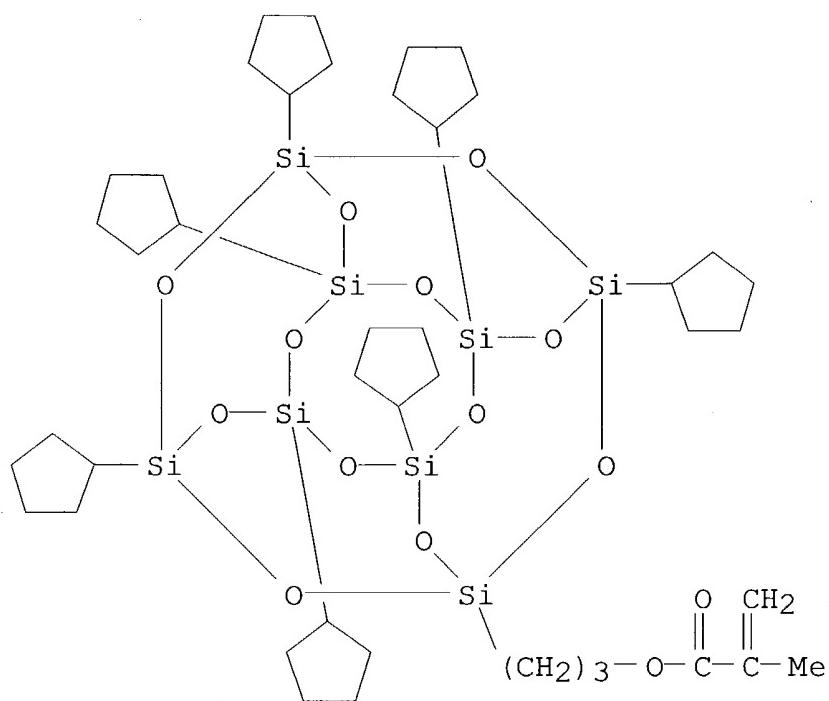
RN 169699-57-4 HCA

CN 2-Propenoic acid, 2-methyl-, 3-(heptacyclopentylpentacyclo[9.5.1.13, 9.15,15.17,13]octasiloxanyl)propyl ester, homopolymer (9CI)... (CA INDEX NAME)

CM 1

CRN 169391-91-7

CMF C42 H74 O14 Si8



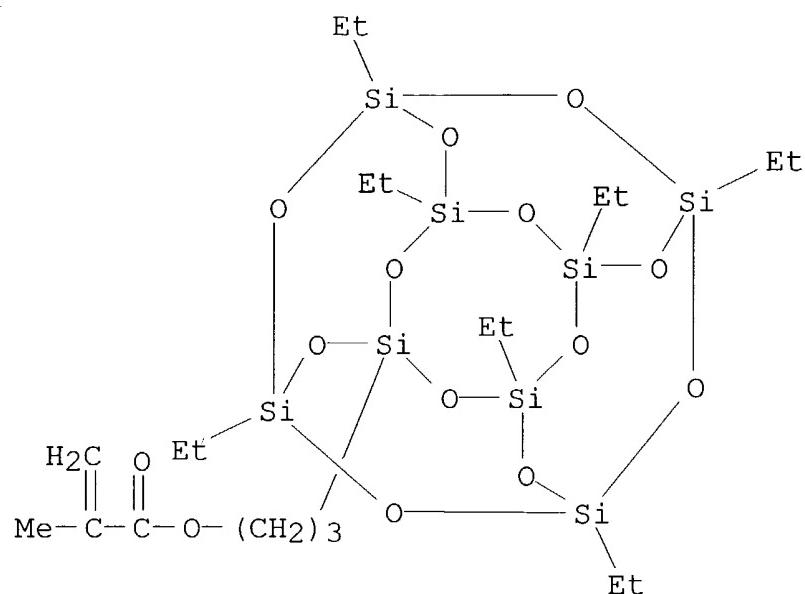
RN 509106-75-6 HCA

CN 2-Propenoic acid, 2-methyl-, 1,1-dimethylethyl ester, polymer with 3-(heptaethylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

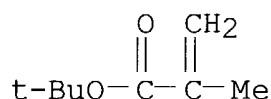
CM 1

CRN 509106-74-5

CMF C21 H46 O14 Si8

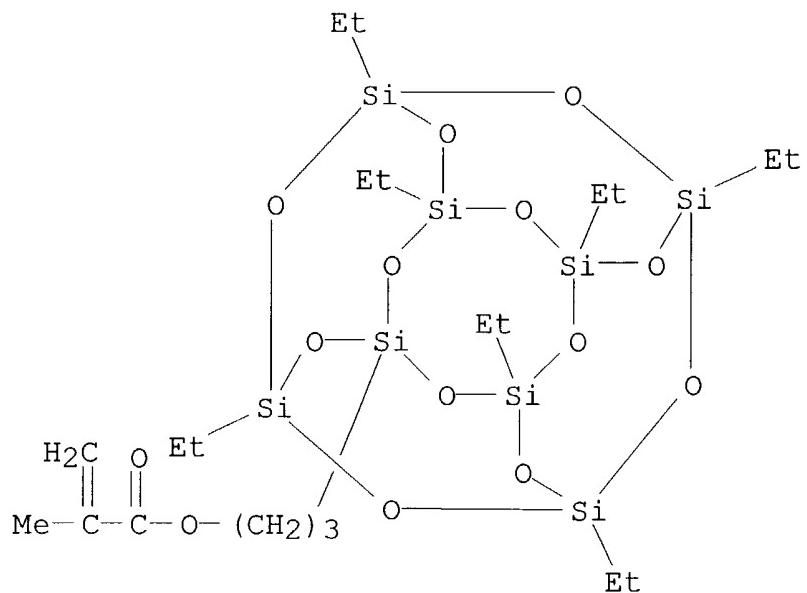


CM 2

CRN 585-07-9  
CMF C8 H14 O2RN 632330-68-8 HCA  
CN 2-Propenoic acid, 2-methyl-, 3-(heptaethylpentacyclo[9.5.1.13,9.15,1.5.17,13]octasiloxanyl)propyl ester, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 509106-74-5  
CMF C21 H46 O14 Si8



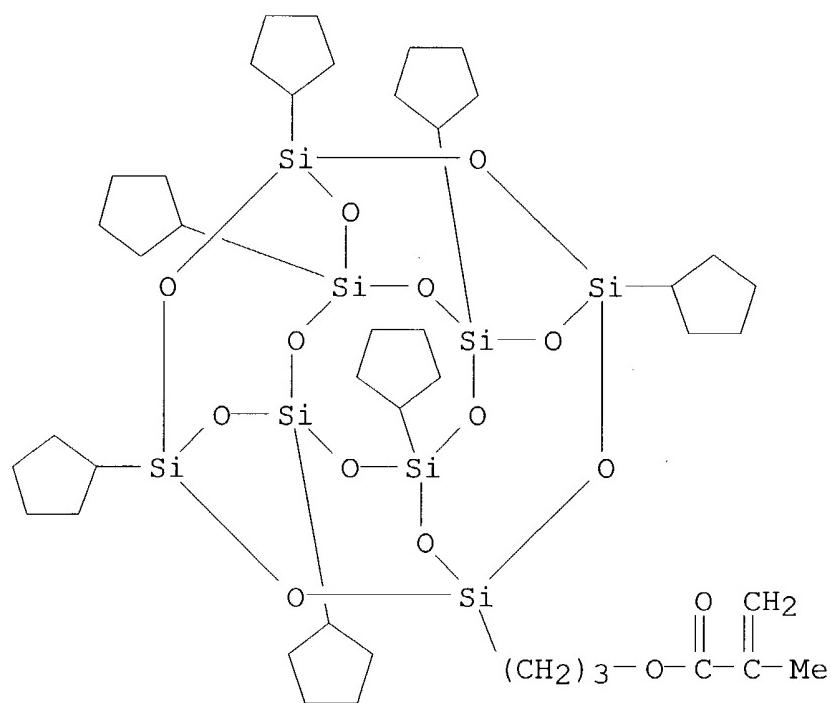
RN 632330-69-9 HCA

CN 2-Propenoic acid, 2-methyl-, polymer with dihydro-3-methylene-2,5-furandione, 1,1-dimethylethyl 2-methyl-2-propenoate, 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate and 2-(trifluoromethyl)-2-propenoic acid (9CI) (CA INDEX NAME)

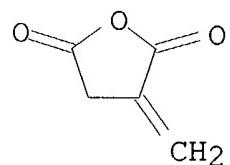
CM 1

CRN 169391-91-7

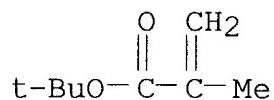
CMF C42 H74 O14 Si8



CM 2

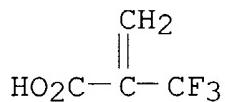
CRN 2170-03-8  
CMF C5 H4 O3

CM 3

CRN 585-07-9  
CMF C8 H14 O2

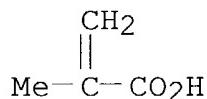
CM 4

CRN 381-98-6  
CMF C4 H3 F3 O2



CM 5

CRN 79-41-4  
CMF C4 H6 O2

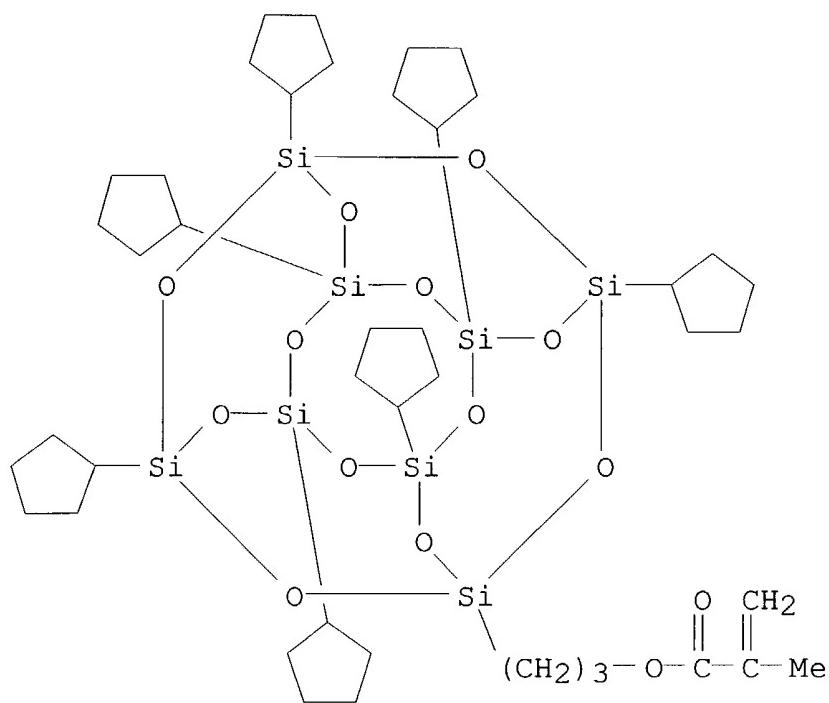


RN 632330-70-2 HCA

CN 2-Propenoic acid, 2-methyl-, 1,1-dimethylethyl ester, polymer with 2,5-furandione, 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate and 2-propenoic acid (9CI) (CA INDEX NAME)

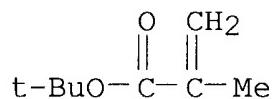
CM 1

CRN 169391-91-7  
CMF C42 H74 O14 Si8



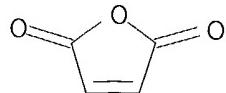
CM 2

CRN 585-07-9

CMF C<sub>8</sub> H<sub>14</sub> O<sub>2</sub>

CM 3

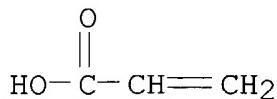
CRN 108-31-6

CMF C<sub>4</sub> H<sub>2</sub> O<sub>3</sub>

CM 4

CRN 79-10-7

CMF C3 H4 O2



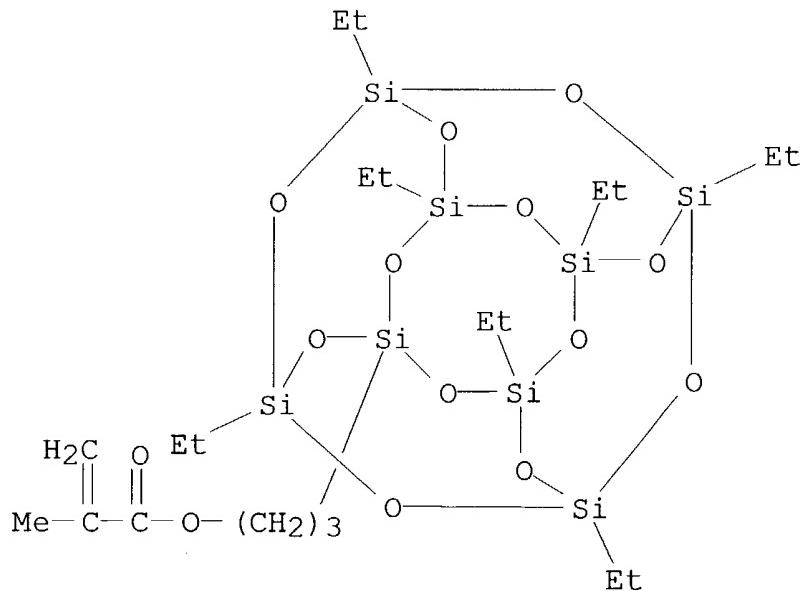
RN 632330-71-3 HCA

CN 2-Propenoic acid, 2-methyl-, polymer with 1,1-dimethylethyl  
 2-methyl-2-propenoate and 3-(heptaethylpentacyclo[9.5.1.13,9.15,15.1  
 7,13]octasiloxanyl)propyl 2-methyl-2-propenoate (9CI) (CA INDEX  
 NAME)

CM 1

CRN 509106-74-5

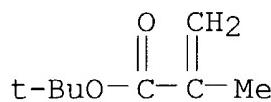
CMF C21 H46 O14 Si8



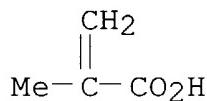
CM 2

CRN 585-07-9

CMF C8 H14 O2

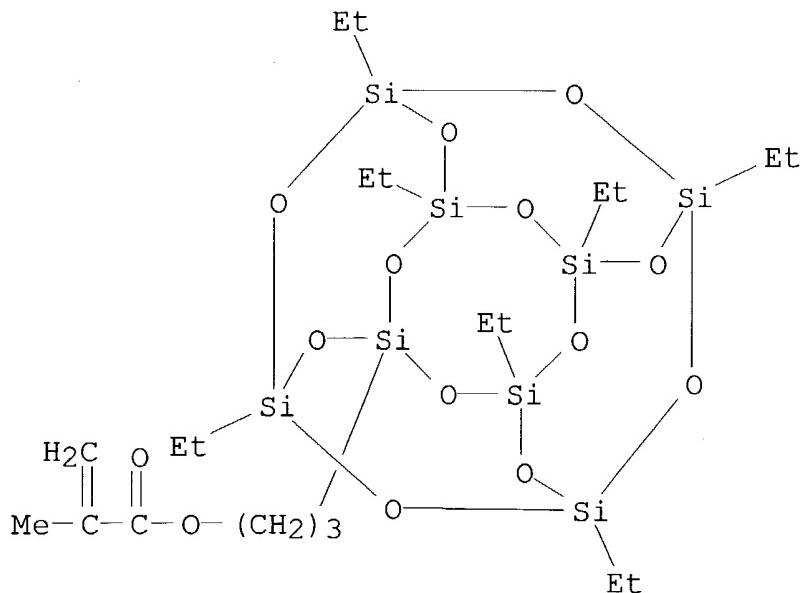


CM 3

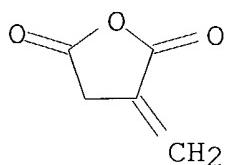
CRN 79-41-4  
CMF C4 H6 O2

RN 632330-72-4 HCA  
 CN 2-Propenoic acid, 2-methyl-, polymer with dihydro-3-methylene-2,5-furandione, 1,1-dimethylethyl 2-methyl-2-propenoate and 3-(heptaethylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

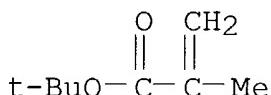
CM 1

CRN 509106-74-5  
CMF C21 H46 O14 Si8

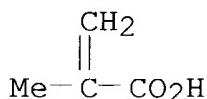
CM 2

CRN 2170-03-8  
CMF C5 H4 O3

CM 3

CRN 585-07-9  
CMF C8 H14 O2

CM 4

CRN 79-41-4  
CMF C4 H6 O2IC ICM G03F007-075  
ICS G03F007-11CC 74-6 (Radiation Chemistry, Photochemistry, and Photographic and  
Other Reprographic Processes)ST lithog **photoresist** polyhedral oligomeric silsesquioxane

IT Lithography

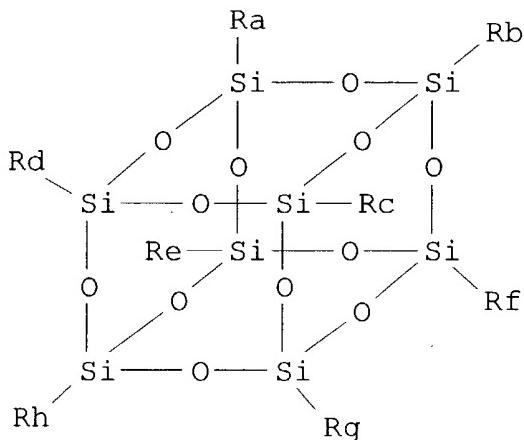
**Photoresists**(lithog. materials based on polymers contg. polyhedral oligomeric  
silsesquioxanes)IT 169699-57-4 509106-75-6 632330-68-8  
632330-69-9 632330-70-2 632330-71-3  
632330-72-4

(lithog. materials based on polymers contg. polyhedral oligomeric

silsesquioxanes)

L11 ANSWER 7 OF 18 HCA COPYRIGHT 2004 ACS on STN  
 139:283405 Intermediate layer composition of three-layered  
**photoresists** and method for pattern formation using the  
 same. Uenishi, Kazuya (Fuji Photo Film Co., Ltd., Japan). Jpn.  
 Kokai Tokkyo Koho JP 2003280207 A2 20031002, 37 pp. (Japanese).  
 CODEN: JKXXAF. APPLICATION: JP 2002-81328 20020322.

GI



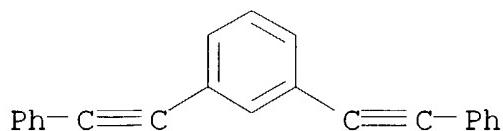
I

- AB The title compn. contains a polymer having octakis(silsesquioxane) structure, wherein the polymer is prep'd. from I(Ra-h = H, halo, alkyl) and R1-CC-(R2)a-CC-R3( R1,3 = mono-valent org. or organometallic group R2 = 2-valent org. or organometallic group) by hydroxyl polymn. in the presence of a catalyst contg. Pt. The compn. is sol. in an org. solvent, shows good storageability, and provides good pattern profile.
- IT 199869-66-4P, 1,3-Bis(phenylethynyl)benzene/Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane copolymer 199869-68-6P  
 (polymer in intermediate layer of three-layered  
**photoresists**)
- RN 199869-66-4 HCA
- CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, polymer with  
 1,3-bis(phenylethynyl)benzene (9CI) (CA INDEX NAME)

CM 1

CRN 13141-36-1

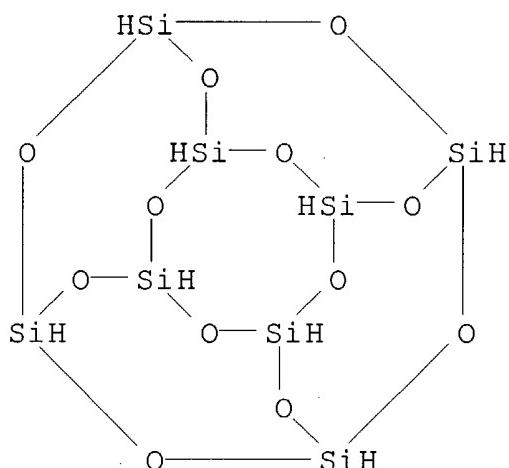
CMF C22 H14



CM 2

CRN 281-50-5

CMF H8 O12 Si8



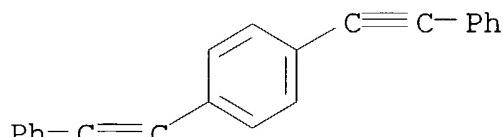
RN 199869-68-6 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, polymer with  
1,4-bis(phenylethynyl)benzene (9CI) (CA INDEX NAME)

CM 1

CRN 1849-27-0

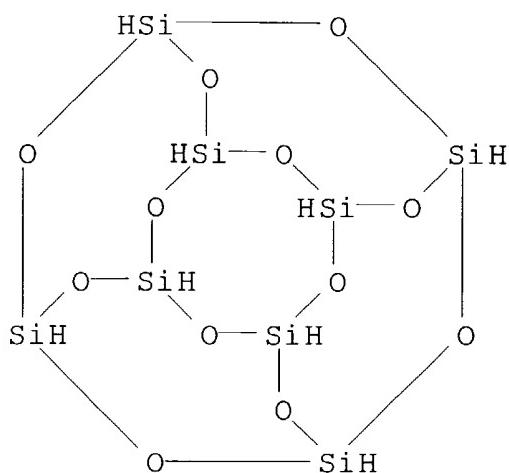
CMF C22 H14



CM 2

CRN 281-50-5

CMF H8 O12 Si8



- IC ICM G03F007-11  
ICS C08G077-50; G03F007-075; G03F007-26; H01L021-027
- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)  
Section cross-reference(s): 76
- ST intermediate layer compn layered **photoresist**
- IT **Photoresists**  
Semiconductor device fabrication  
(intermediate layer compn. of three-layered **photoresists**  
and method for pattern formation using the same)
- IT Silsesquioxanes  
(polymer in intermediate layer of three-layered  
**photoresists**)
- IT 145538-55-2, PC 072  
(polymer in intermediate layer of three-layered  
**photoresists**)
- IT 199869-66-4P, 1,3-Bis(phenylethynyl)benzene/Pentacyclo[9.5.1].13,9.15,15.17,13]octasiloxane copolymer 199869-68-6P  
(polymer in intermediate layer of three-layered  
**photoresists**)
- L11 ANSWER 8 OF 18 HCA COPYRIGHT 2004 ACS on STN  
139:188229 High sensitivity nanocomposite **resists** for EUV  
lithography. Azam Ali, M.; Gonsalves, K. E.; Golovkina, V.;  
Cerrina, F. (Department of Chemistry and Cameron Applied Research  
Center, Polymer Chemistry NanoTechnology Lab., The University of  
North Carolina, Charlotte, NC, 28223, USA). Microelectronic  
Engineering, 65(4), 454-462 (English) 2003. CODEN: MIENEF. ISSN:  
0167-9317. Publisher: Elsevier Science B.V..
- AB A novel nanocomposite **photoresist** was synthesized for

extreme UV lithog. (EUVL) by a radical polymn. process. This resist system exhibited enhanced sensitivity and contrast for EUVL. The potential for EUVL nanofeatures is also examd. The high sensitivity and the desirable contrast in this resist, indicates that it is a promising candidate not only for sub-100 nm resln. EUVL, but also for X-ray lithog. and low voltage electron beam lithog.

IT 461699-74-1

(high sensitivity nanocomposite resists for EUV  
lithog.)

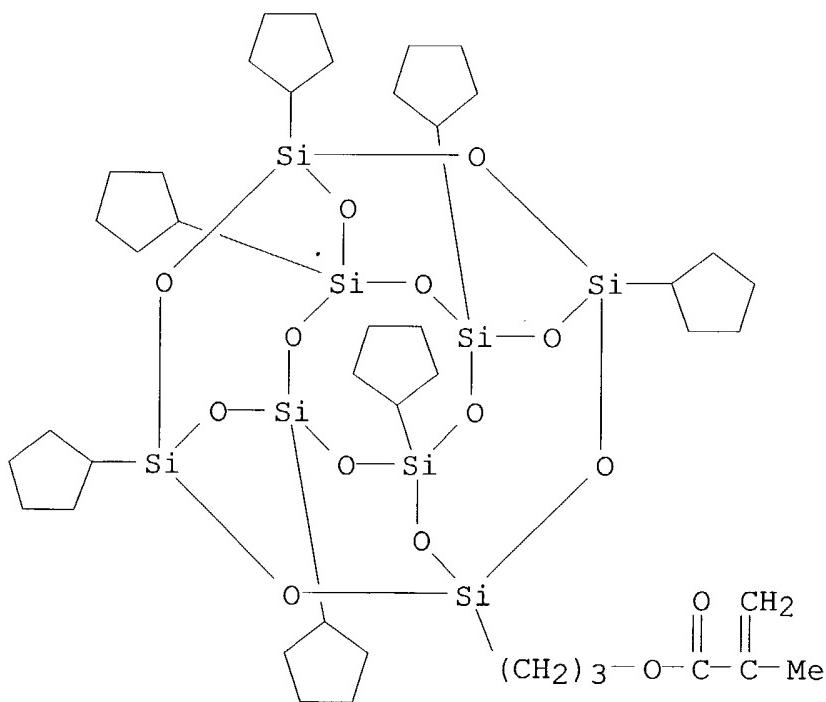
RN 461699-74-1 HCA

CN Sulfonium, dimethyl[4-[ (2-methyl-1-oxo-2-propenyl)oxy]phenyl]-, salt with trifluoromethanesulfonic acid (1:1), polymer with 1,1-dimethylethyl 2-methyl-2-propenoate, 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate, methyl 2-methyl-2-propenoate and 2-methyl-2-propenoic acid (9CI) (CA INDEX NAME)

CM 1

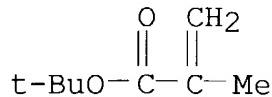
CRN 169391-91-7

CMF C42 H74 O14 Si8



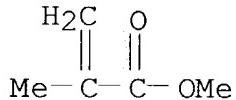
CM 2

CRN 585-07-9  
CMF C8 H14 O2



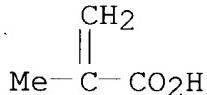
CM 3

CRN 80-62-6  
CMF C5 H8 O2



CM 4

CRN 79-41-4  
CMF C4 H6 O2

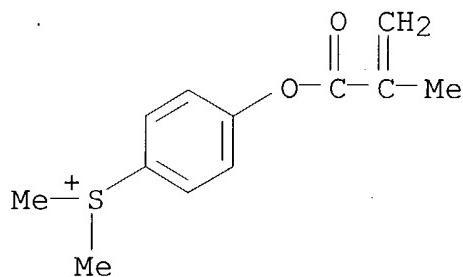


CM 5

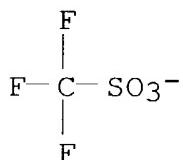
CRN 352455-54-0  
CMF C12 H15 O2 S . C F3 O3 S

CM 6

CRN 141718-72-1  
CMF C12 H15 O2 S



CM 7

CRN 37181-39-8  
CMF C F3 O3 S

- CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST high sensitivity nanocomposite **resist** EUV lithog  
**photoresist** photoacid generator
- IT Photolithography  
(UV; high sensitivity nanocomposite **resists** for EUV lithog.)
- IT Nanocomposites  
**Photoresists**  
(high sensitivity nanocomposite **resists** for EUV lithog.)
- IT 75-59-2, Tetramethylammonium hydroxide  
(developer; high sensitivity nanocomposite **resists** for EUV lithog.)
- IT **461699-74-1**  
(high sensitivity nanocomposite **resists** for EUV lithog.)

L11 ANSWER 9 OF 18 HCA COPYRIGHT 2004 ACS on STN  
 138:311424 Evaluation of siloxane and polyhedral silsesquioxane copolymers for 157 nm lithography. Bellas, V.; Tegou, E.; Raptis, I.; Gogolides, E.; Argitis, P.; Iatrou, H.; Hadjichristidis, N.; Sarantopoulou, E.; Cefalas, A. C. (Institute of Microelectronics, NCSR Demokritos, Aghia Paraskevi, 15310, Greece). Journal of Vacuum

Science & Technology, B: Microelectronics and Nanometer Structures, 20(6), 2902-2908 (English) 2002. CODEN: JVTBD9. ISSN: 0734-211X.  
Publisher: American Institute of Physics.

AB Siloxane and silsesquioxane copolymers have been synthesized and first evaluated as potential components of 157 nm **resist** materials. In block copolymers of dimethylsiloxane and tert-Bu methacrylate neg. imaging chem. dominates at 157 nm, due to the presence of the siloxane component, although pos. imaging in aq. base developers via chem. amplification was obtained at longer wavelengths (248 nm). The same behavior is obsd. in graft copolymers of dimethylsiloxane and tert-Bu methacrylate. On the other hand, random copolymers of polymerizable polyhedral oligomeric silsesquioxane monomers with various acrylates, including partially fluorinated, can be used as components of **resist** formulations that provide pos. imaging at 157 nm, aq. base development, and physicochem. properties which resemble those of conventional poly(meth)acrylates. Pattern transfer properties depend on the selection of the silsesquioxane component. Polymers contg. 30% or higher wt./wt. ethyl-substituted silsesquioxane cages provide the necessary etch resistance as well as low surface roughness to oxygen plasma at 100 nm film thickness, allowing bilayer 157 nm lithog., even without further absorbance optimization.

IT 302347-60-0P 509106-75-6P 509106-76-7P  
509106-77-8P 509106-78-9P

(evaluation of siloxane and polyhedral silsesquioxane copolymers for 157 nm lithog.)

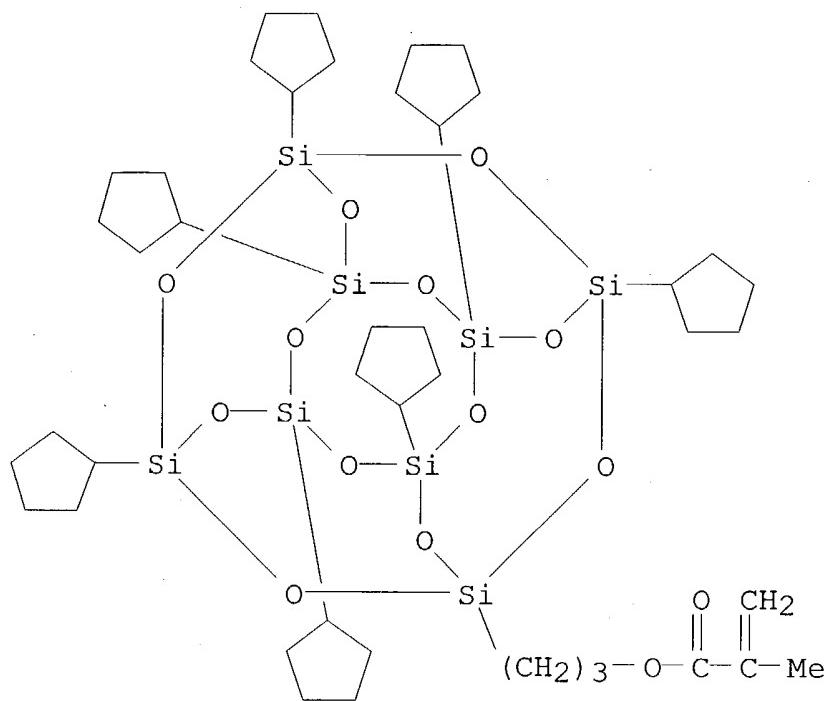
RN 302347-60-0 HCA

CN 2-Propenoic acid, 2-methyl-, 1,1-dimethylethyl ester, polymer with 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

CM 1

CRN 169391-91-7

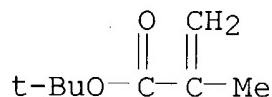
CMF C42 H74 O14 Si8



CM 2

CRN 585-07-9

CMF C8 H14 O2



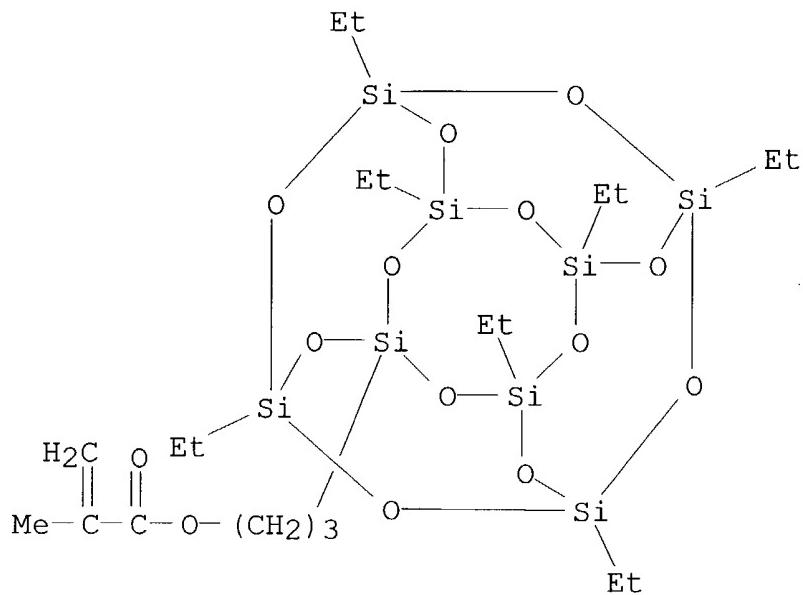
RN 509106-75-6 HCA

CN 2-Propenoic acid, 2-methyl-, 1,1-dimethylethyl ester, polymer with  
3-(heptaethylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl  
2-methyl-2-propenoate (9CI) (CA INDEX NAME)

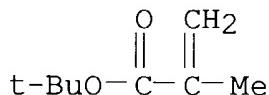
CM 1

CRN 509106-74-5

CMF C21 H46 O14 Si8



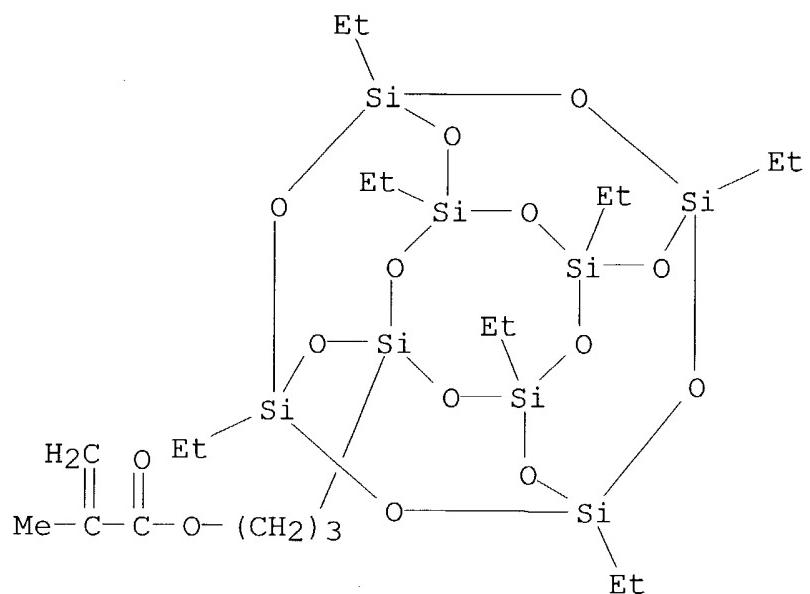
CM 2

CRN 585-07-9  
CMF C8 H14 O2

RN 509106-76-7 HCA  
 CN 2-Propenoic acid, 2-methyl-, 3-(heptaethylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl ester, polymer with dihydro-3-methylene-2,5-furandione and methyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

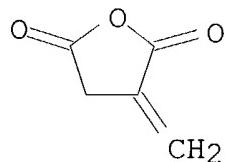
CM 1

CRN 509106-74-5  
CMF C21 H46 O14 Si8



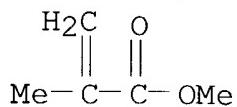
CM 2

CRN 2170-03-8  
 CMF C5 H4 O3



CM 3

CRN 80-62-6  
 CMF C5 H8 O2



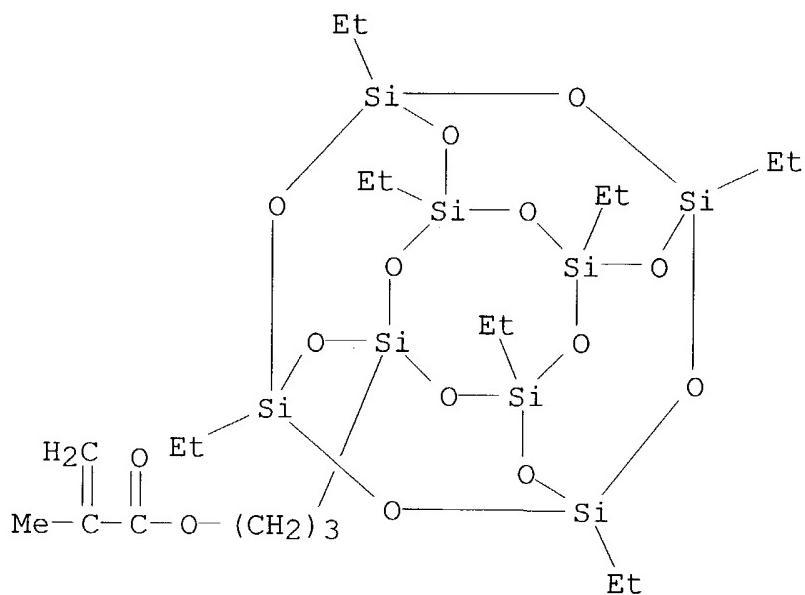
RN 509106-77-8 HCA

CN 2-Propenoic acid, 2-methyl-, 1,1-dimethylethyl ester, polymer with 3-(heptaethylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl

2-methyl-2-propenoate and methyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

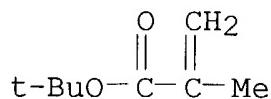
CM 1

CRN 509106-74-5  
CMF C21 H46 O14 Si8



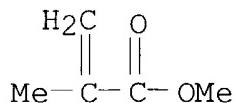
CM 2

CRN 585-07-9  
CMF C8 H14 O2



CM 3

CRN 80-62-6  
CMF C5 H8 O2



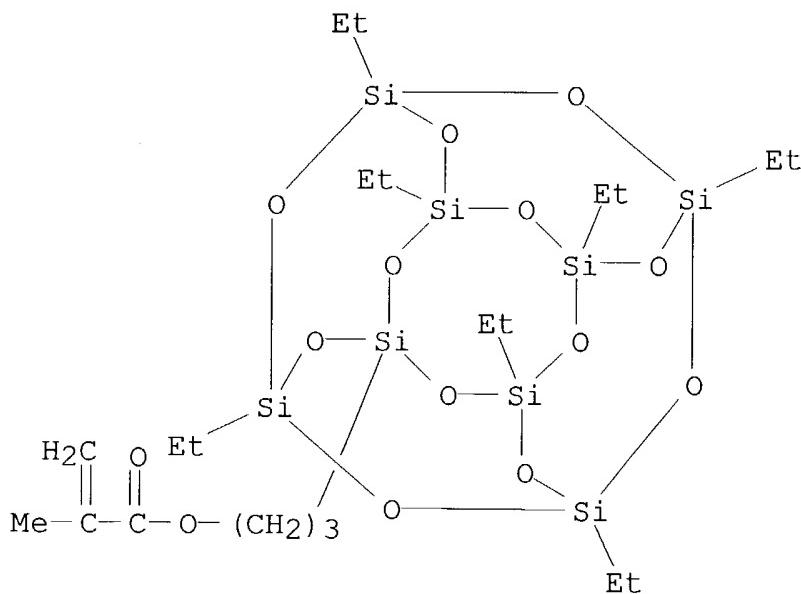
RN 509106-78-9 HCA

CN 2-Propenoic acid, 2-methyl-, 3-(heptaethylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl ester, polymer with  
2-(trifluoromethyl)-2-propenoic acid (9CI) (CA INDEX NAME)

CM 1

CRN 509106-74-5

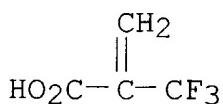
CMF C21 H46 O14 Si8



CM 2

CRN 381-98-6

CMF C4 H3 F3 O2

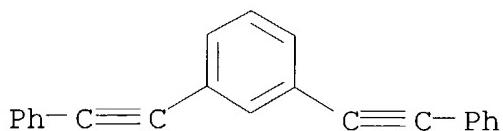


CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and

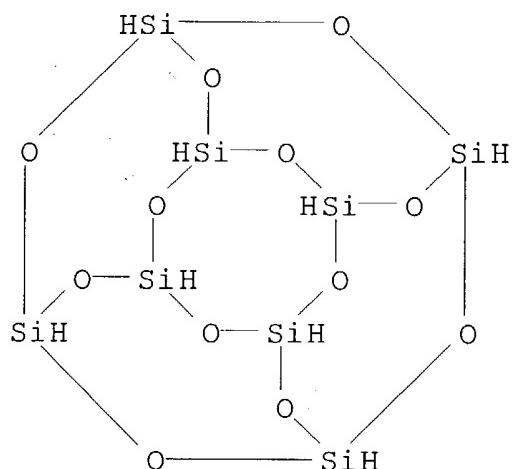
- Other Reprographic Processes)  
 Section cross-reference(s) : 38  
 IT Electron beam **resists**  
 Photolithography  
**Photoresists**  
 Surface roughness  
 (evaluation of siloxane and polyhedral silsesquioxane copolymers  
 for 157 nm lithog.)  
 IT 302347-60-0P 509106-73-4P 509106-75-6P  
 509106-76-7P 509106-77-8P 509106-78-9P  
 509108-05-8P  
 (evaluation of siloxane and polyhedral silsesquioxane copolymers  
 for 157 nm lithog.)
- L11 ANSWER 10 OF 18 HCA COPYRIGHT 2004 ACS on STN  
 137:287293 Heat-resistant silsesquioxane-based polymers and their films  
 and manufacture method. Kobayashi, Toshiaki; Hayashi, Teruyuki;  
 Tanaka, Masato; Yamaguchi, Koichi (Ministry of Economy, Trade and  
 Industry; National Industrial Research Institute, Japan; National  
 Institute of Advanced Industrial Science and Technology). Jpn.  
 Kokai Tokkyo Koho JP 2002284878 A2 20021003, 8 pp. (Japanese).  
 CODEN: JKXXAF. APPLICATION: JP 2001-91233 20010327.
- AB The polymers are prep'd. by reacting hydridosilsesquioxanes  
 $(HSiO_3/2)_n$  ( $n = 4-1000$ ) with  $RC.tpbond.C(R')qC.tpbond.CR$  [ $R =$   
 (un)substituted org. group, organosilyl group;  $R' =$  (un)substituted  
 divalent org. group, organometallic group;  $q = 0, 1$ ] or  
 (un)substituted monoacetylenes. The films obtained from the  
 polymers have good adhesion with substrates, and are useful for  
 prodn. of crack-free dielec. films, semiconductor passivation films,  
**resists**, and interlayer insulating films. Thus, a copolymer  
 of 1,3-bis(phenylethynyl)benzene and pentacyclo[9.5.1.13,9.15,15.17,  
 13]octasiloxane was dissolved in THF, spin-coated on glass, and  
 heated at 110° for 10 min to give a smooth film showing no  
 cracks.
- IT 199869-66-4P, 1,3-Bis(phenylethynyl)benzene-  
 pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane copolymer  
 (heat-resistant silsesquioxane-based polymers for dielec. films)
- RN 199869-66-4 HCA
- CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, polymer with  
 1,3-bis(phenylethynyl)benzene (9CI) (CA INDEX NAME)

CM 1

CRN 13141-36-1  
CMF C22 H14



CM 2

CRN 281-50-5  
CMF H8 O12 Si8

IC ICM C08G077-50

ICS C09D005-25; C09D183-14; H01L021-312

CC 76-2 (Electric Phenomena)

Section cross-reference(s): 38, 74

IT 199869-66-4P, 1,3-Bis(phenylethynyl)benzene-pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane copolymer  
(heat-resistant silsesquioxane-based polymers for dielec. films)

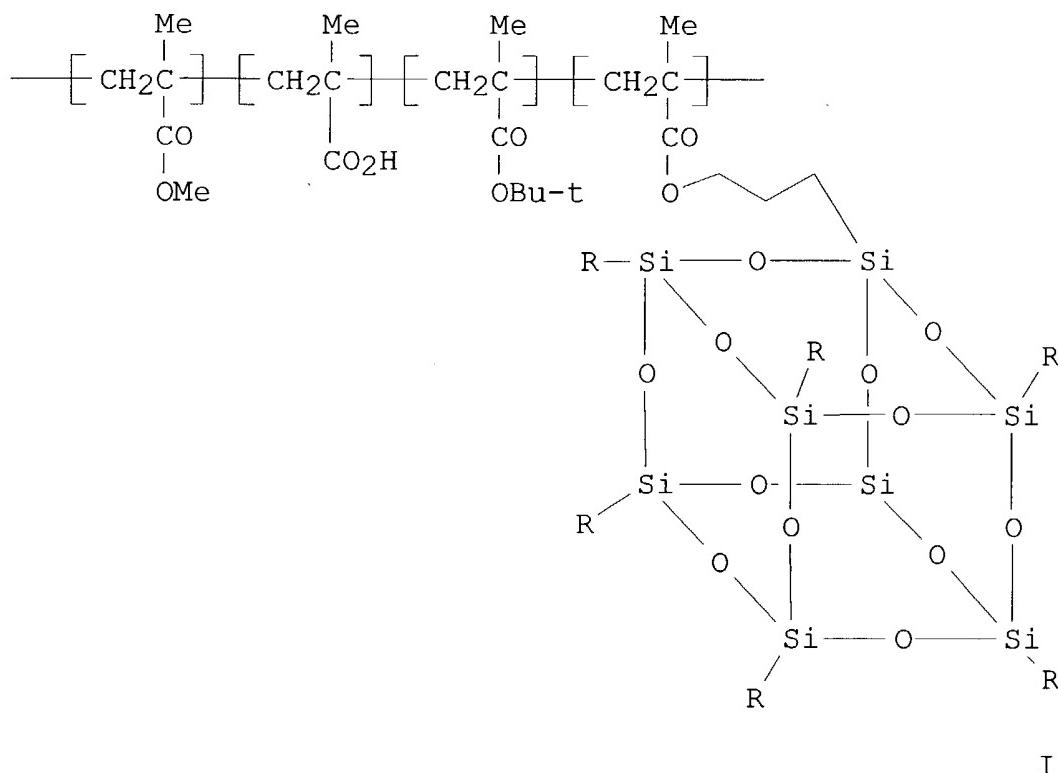
L11 ANSWER 11 OF 18 HCA COPYRIGHT 2004 ACS on STN

137:270509 High resolution **resists** comprising nanoparticles and inorganic moieties for next generation lithographies.

Gonsalves, Kenneth E. (University of North Carolina at Charlotte, USA; University of Connecticut). PCT Int. Appl. WO 2002073308 A1 20020919, 62 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY,

KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2002-US7338 20020311. PRIORITY: US 2001-PV274719 20010312.

GI



I

AB The present invention provides new high resoln. **resists** applicable to next generation lithogs., methods of making these novel **resists**, and methods of using these new **resists** in lithog. processes to effect state-of-the-art lithogs. New nanocomposite **resists** comprising polymers of the general formula I (R = alkyl, cycloalkyl, silyl, aryl, aralkyl, alkenyl) and nanoparticles in a polymer matrix are provided in the invention. New chem. amplified **resists** that incorporate inorg. moieties as part of the polymer and chem. amplified **resists** that incorporate photoacid generating groups within the polymeric chain are presented. Novel non-chem. amplified yet photosensitive **resists**, and new org.-inorg. hybrid **resists** are also provided. This invention and the

embodiments described constitute fundamentally new architectures for high resoln. **resists** that achieve high sensitivity, contrast, resoln. and high plasma etch resistance.

IT 352455-55-1P 362675-17-0P 461699-74-1P

(chem. amplified **resists** comprising copolymers with sulfonium photoacid generator monomer)

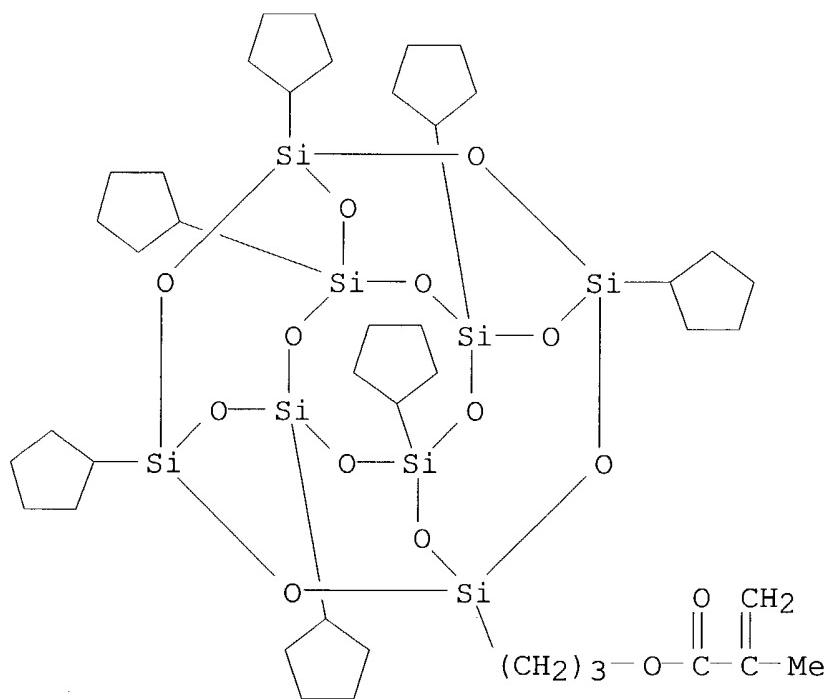
RN 352455-55-1 HCA

CN Sulfonium, dimethyl[4-[(2-methyl-1-oxo-2-propenyl)oxy]phenyl]-, salt with trifluoromethanesulfonic acid (1:1), polymer with 1,1-dimethylethyl 2-methyl-2-propenoate and 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

CM 1

CRN 169391-91-7

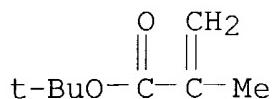
CMF C42 H74 O14 Si8



CM 2

CRN 585-07-9

CMF C8 H14 O2



CM 3

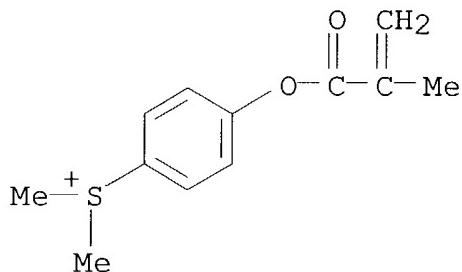
CRN 352455-54-0

CMF C12 H15 O2 S . C F3 O3 S

CM 4

CRN 141718-72-1

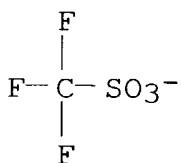
CMF C12 H15 O2 S



CM 5

CRN 37181-39-8

CMF C F3 O3 S

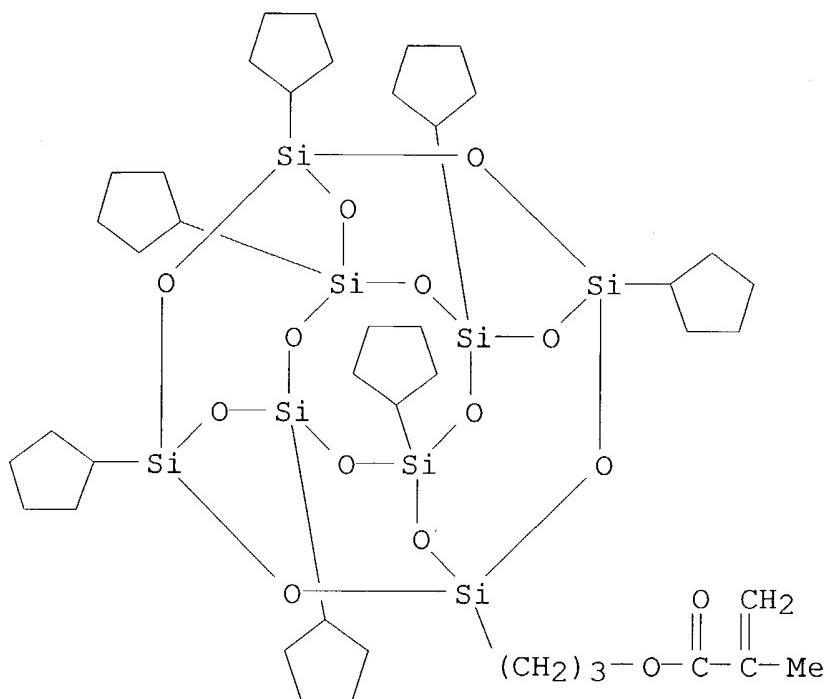


RN 362675-17-0 HCA

CN Sulfonium, dimethyl[4-[(2-methyl-1-oxo-2-propenyl)oxy]phenyl]-, salt with trifluoromethanesulfonic acid (1:1), polymer with dihydro-3-methylene-2,5-furandione, 1,1-dimethylethyl 2-methyl-2-propenoate, 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,1.5.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate and methyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

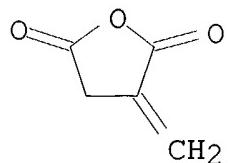
CM 1

CRN 169391-91-7  
 CMF C42 H74 O14 Si8



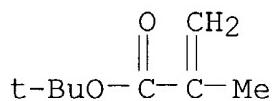
CM 2

CRN 2170-03-8  
 CMF C5 H4 O3

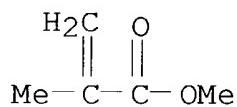


CM 3

CRN 585-07-9  
 CMF C8 H14 O2



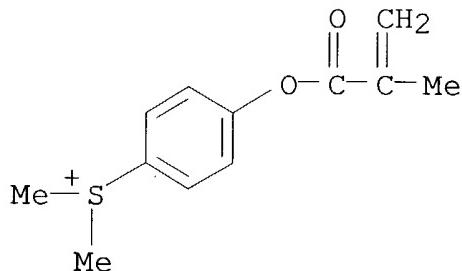
CM 4

CRN 80-62-6  
CMF C5 H8 O2

CM 5

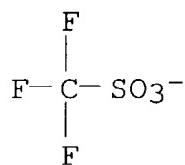
CRN 352455-54-0  
CMF C12 H15 O2 S . C F3 O3 S

CM 6

CRN 141718-72-1  
CMF C12 H15 O2 S

CM 7

CRN 37181-39-8  
CMF C F3 O3 S



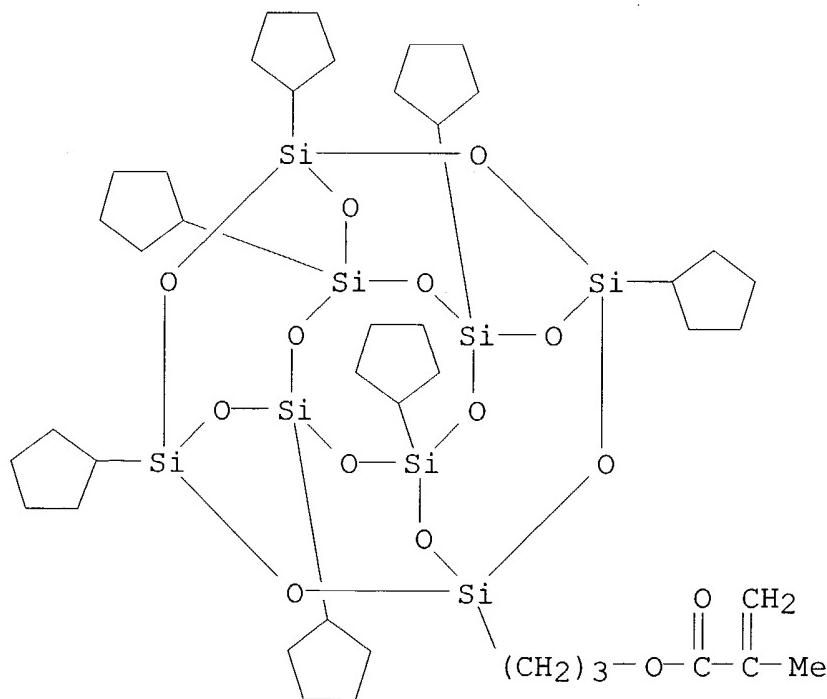
RN 461699-74-1 HCA

CN Sulfonium, dimethyl[4-[(2-methyl-1-oxo-2-propenyl)oxy]phenyl]-, salt with trifluoromethanesulfonic acid (1:1), polymer with 1,1-dimethylethyl 2-methyl-2-propenoate, 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate, methyl 2-methyl-2-propenoate and 2-methyl-2-propenoic acid (9CI) (CA INDEX NAME)

CM 1

CRN 169391-91-7

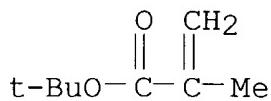
CMF C42 H74 O14 Si8



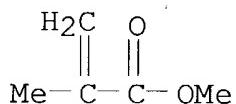
CM 2

CRN 585-07-9

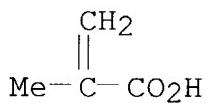
CMF C8 H14 O2



CM 3

CRN 80-62-6  
CMF C5 H8 O2

CM 4

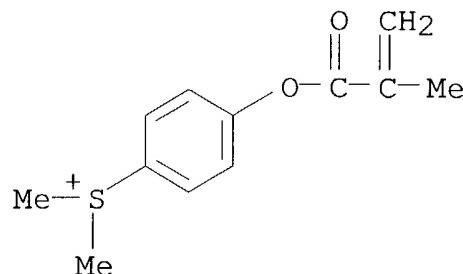
CRN 79-41-4  
CMF C4 H6 O2

CM 5

CRN 352455-54-0  
CMF C12 H15 O2 S . C F3 O3 S

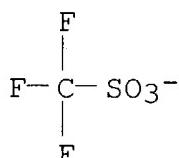
CM 6

CRN 141718-72-1  
CMF C12 H15 O2 S



CM 7

CRN 37181-39-8  
CMF C F3 O3 S



IT 359408-40-5P

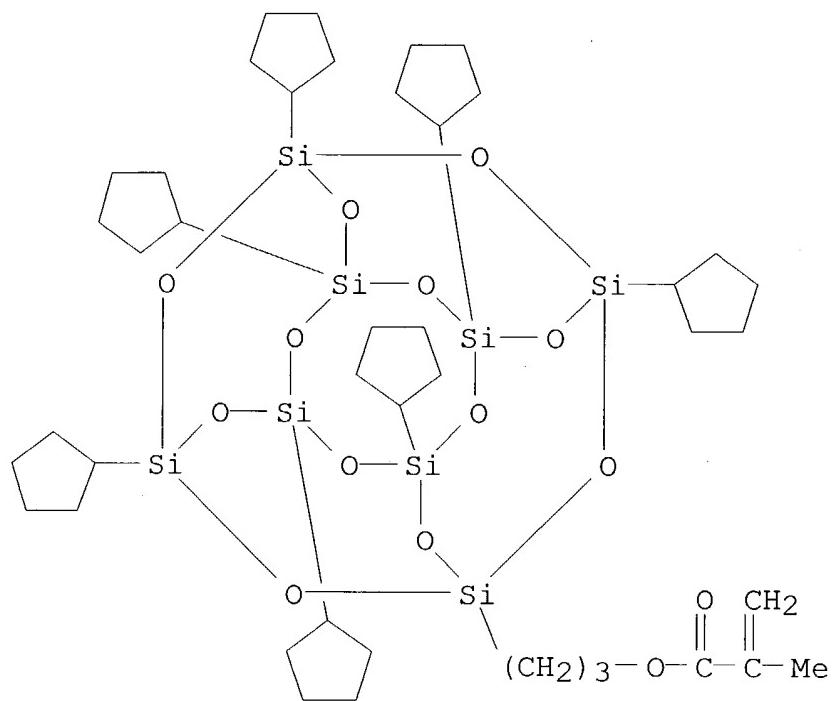
(chem. amplified **resists** comprising polyhydral oligosilsesquioxanes, nanoparticles and inorg. moieties)

RN 359408-40-5 HCA

CN 2-Propenoic acid, 2-methyl-, polymer with 1,1-dimethylethyl  
2-methyl-2-propenoate, 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,1.  
5.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate and methyl  
2-methyl-2-propenoate (9CI) (CA INDEX NAME)

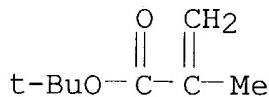
CM 1

CRN 169391-91-7  
CMF C42 H74 014 Si8



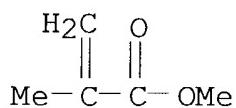
CM 2

CRN 585-07-9  
 CMF C8 H14 O2



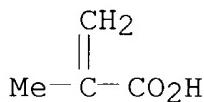
CM 3

CRN 80-62-6  
 CMF C5 H8 O2



CM 4

CRN 79-41-4  
 CMF C4 H6 O2



- IC ICM G03C001-725  
 ICS G03F007-039; G03F007-075; G03F007-26  
 CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)  
 Section cross-reference(s): 38, 76  
 ST chem amplified **resist** nanoparticle silsesquioxane photoacid generator copolymer polymer; lithog electron ion beam x ray chem amplified **resist**; photolithog UV chem amplified **resist** nanoparticle silsesquioxane  
 IT Photolithography  
 (UV; chem. amplified **resists** comprising copolymers with sulfonium photoacid generator monomer for)  
 IT **Resists**  
 (chem. amplified **resists** comprising copolymers with sulfonium photoacid generator monomer)  
 IT Electron beam lithography  
 Ion beam lithography  
 X-ray lithography  
 (chem. amplified **resists** comprising copolymers with sulfonium photoacid generator monomer for)  
 IT Integrated circuits  
 (chem. amplified **resists** comprising copolymers with sulfonium photoacid generator monomer for fabrication of)  
 IT Polyoxymethylenes, preparation  
 (chem. amplified **resists** comprising polyacetals)  
 IT Silsesquioxanes  
 (chem. amplified **resists** comprising polyhydral oligosilsesquioxanes, nanoparticles and inorg. moieties)  
 IT 43127-35-1, ZEP 520  
 (ZEP 520; chem. amplified **resists** comprising polyhydral oligosilsesquioxanes, nanoparticles and inorg. moieties)  
 IT 352455-55-1P 362675-17-0P 461699-74-1P  
 (chem. amplified **resists** comprising copolymers with sulfonium photoacid generator monomer)  
 IT 461699-77-4P 461699-80-9P  
 (chem. amplified **resists** comprising polyacetals)  
 IT 359408-40-5P  
 (chem. amplified **resists** comprising polyhydral oligosilsesquioxanes, nanoparticles and inorg. moieties)

- IT 136849-03-1  
(chem. amplified **resists** comprising polyhydral oligosilsesquioxanes, nanoparticles and inorg. moieties)
- IT 338731-99-0P  
(chem. amplified **resists** comprising sulfonium photoacid generator polymer)
- IT 2170-03-8, Itaconic anhydride  
(dissoln. promoter; chem. amplified **resists** comprising copolymers with sulfonium photoacid generator monomer)

L11 ANSWER 12 OF 18 HCA COPYRIGHT 2004 ACS on STN  
136:110029 Novel CA **resists** with photoacid generator in polymer chain. Wu, Hengpeng; Gonsalves, Kenneth E. (Polymer Program at the Institute of Materials Science & Department of Chemistry, University of Connecticut, Storrs, CT, 06269, USA). Proceedings of SPIE-The International Society for Optical Engineering, 4345(Pt. 1, Advances in Resist Technology and Processing XVIII), 521-527 (English) 2001. CODEN: PSISDG. ISSN: 0277-786X. Publisher: SPIE-The International Society for Optical Engineering.

AB Novel chem. amplified (CA) **resists** with photoacid generating units in the polymer chains were synthesized and their lithog. properties evaluated under both 248 nm and 20 keV electron beam exposures. The pos.-tone CA **resists** were found to exhibit excellent film formation behavior and extremely high sensitivity.

IT 352455-55-1P 362675-17-0P  
(prepn. and lithog. characterization of chem. amplified **photoresists** based on methacrylate polymer contg. sulfonium photoacid generating pendant units).

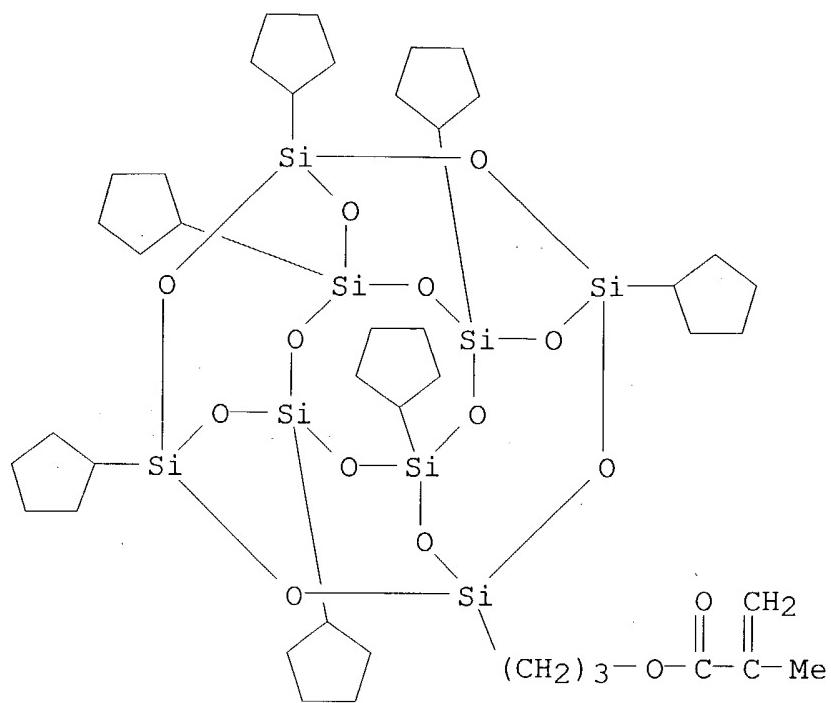
RN 352455-55-1 HCA

CN Sulfonium, dimethyl[4-[(2-methyl-1-oxo-2-propenyl)oxy]phenyl]-, salt with trifluoromethanesulfonic acid (1:1), polymer with 1,1-dimethylethyl 2-methyl-2-propenoate and 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

CM 1

CRN 169391-91-7

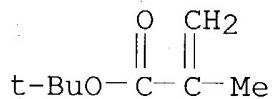
CMF C42 H74 O14 Si8



CM 2

CRN 585-07-9

CMF C8 H14 O2



CM 3

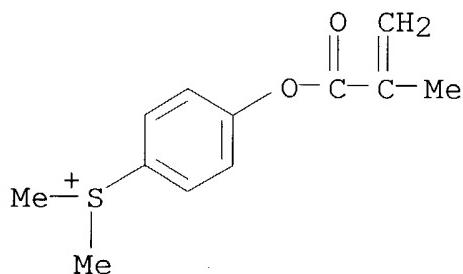
CRN 352455-54-0

CMF C12 H15 O2 S . C F3 O3 S

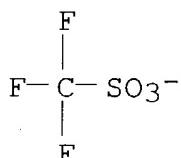
CM 4

CRN 141718-72-1

CMF C12 H15 O2 S



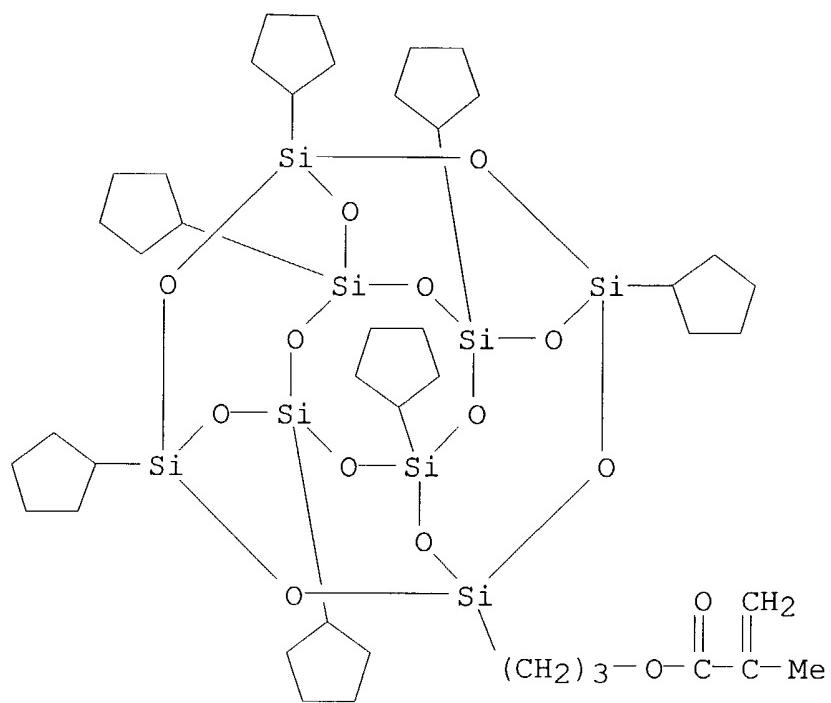
CM 5

CRN 37181-39-8  
CMF C F3 O3 S

RN 362675-17-0 HCA  
 CN Sulfonium, dimethyl[4-[(2-methyl-1-oxo-2-propenyl)oxy]phenyl]-, salt with trifluoromethanesulfonic acid (1:1), polymer with dihydro-3-methylene-2,5-furandione, 1,1-dimethylethyl 2-methyl-2-propenoate, 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,1.5.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate and methyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

CM 1

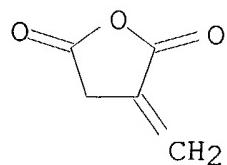
CRN 169391-91-7  
CMF C42 H74 O14 Si8



CM 2

CRN 2170-03-8

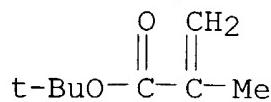
CMF C5 H4 O3



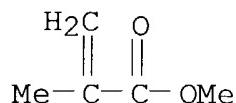
CM 3

CRN 585-07-9

CMF C8 H14 O2



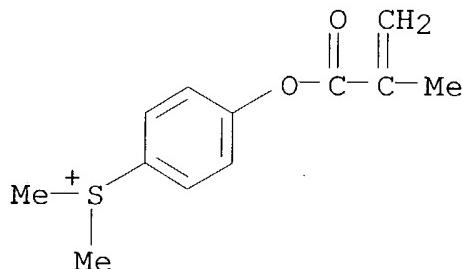
CM 4

CRN 80-62-6  
CMF C5 H8 O2

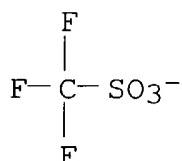
CM 5

CRN 352455-54-0  
CMF C12 H15 O2 S . C F3 O3 S

CM 6

CRN 141718-72-1  
CMF C12 H15 O2 S

CM 7

CRN 37181-39-8  
CMF C F3 O3 SCC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and  
Other Reprographic Processes)  
ST chem amplified **photoresist** methacrylate polymer sulfonium

- photoacid generator pendant; electron beam **resist**  
methacrylate polymer sulfonium acid generator pendant  
IT Positive **photoresists**  
(chem. amplified; prepn. and lithog. characterization of chem.  
amplified **photoresists** based on methacrylate polymer  
contg. sulfonium photoacid generating pendant units)
- IT Electron beam **resists**  
(chem. amplified; prepn. and lithog. characterization of chem.  
amplified **resists** based on methacrylate polymer contg.  
sulfonium acid generating pendant units)
- IT 75-59-2, Tetramethylammonium hydroxide  
(developer; prepn. and lithog. characterization of chem.  
amplified **photoresists** based on methacrylate polymer  
contg. sulfonium photoacid generating pendant units)
- IT 352455-55-1P 362675-17-0P 388610-68-2P  
(prepn. and lithog. characterization of chem. amplified  
**photoresists** based on methacrylate polymer contg.  
sulfonium photoacid generating pendant units)
- IT 37286-64-9, Polypropylene glycol methyl ether  
(solvent; prepn. and lithog. characterization of chem. amplified  
**photoresists** based on methacrylate polymer contg.  
sulfonium photoacid generating pendant units)

L11 ANSWER 13 OF 18 HCA COPYRIGHT 2004 ACS on STN  
135:280376 High resolution **resists** for next generation  
lithography: the nanocomposite approach. Gonsalves, Kenneth E.; Wu,  
Hengpeng; Hu, Yongqi; Merhari, Lhadi (Polymer Program at the  
Institute of Materials Science & Department of Chemistry, University  
of Connecticut, Storrs, CT, 06268, USA). Materials Research Society  
Symposium Proceedings, 636(Nonlithographic and Lithographic Methods  
of Nanofabrication: From Ultralarge-Scale Integration to Photonics  
to Molecular Electronics), D6.5/1-D6.5/12 (English) 2001. CODEN:  
MRSPDH. ISSN: 0272-9172. Publisher: Materials Research Society.

AB Except for ion-beam lithog., deep-UV (DUV), x-ray, and in particular  
electron-beam lithog. suffer significantly from proximity effects,  
leading to severe degrdn. of resln. in classical **resists**.  
The authors report a new class of **resists** based on  
org./inorg. nanocomposites having a structure that reduces the  
proximity effects. Synthetic routes are described for a  
ZEP520/nano-SiO<sub>2</sub> **resist** where 47 nm wide lines have been  
written with a 40 nm diam., 20 keV electron beam at no sensitivity  
cost. Other **resist** systems based on polyhedral  
oligosilsesquioxane copolymerd. with Me methacrylate, tert-Bu  
methacrylate, methacrylic acid and a proprietary photoacid generator  
are also presented. These nanocomposite **resists** suitable  
for DUV and electron beam lithog. show enhancement in both contrast  
and RIE resistance in oxygen. Tentative mechanisms responsible for  
proximity effect redn. are also discussed.

IT 359408-40-5 362675-17-0

(lithog. **resists** with improved reactive ion etching  
resistance from methacrylate copolymers contg.  
oligosilsesquioxane pendant)

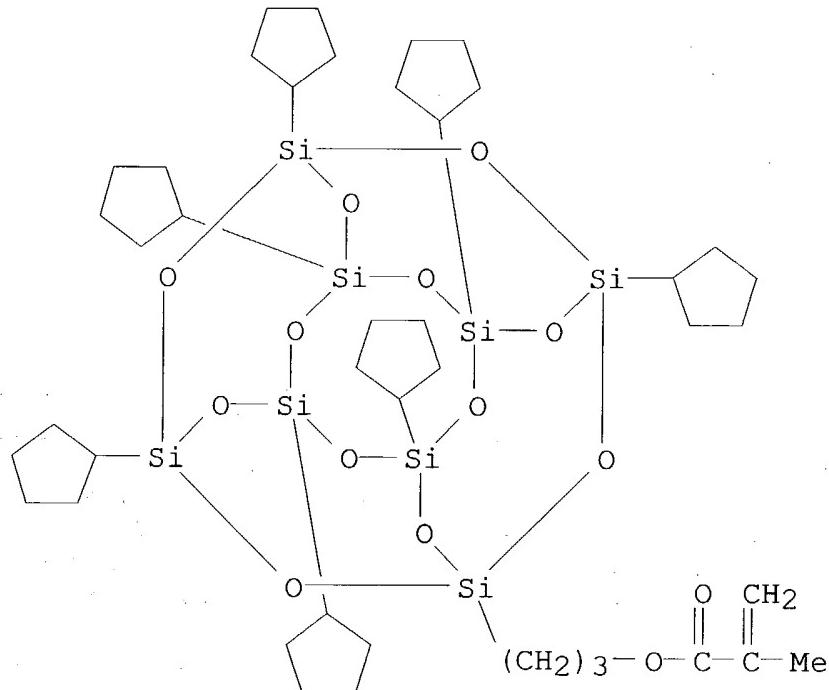
RN 359408-40-5 HCA

CN 2-Propenoic acid, 2-methyl-, polymer with 1,1-dimethylethyl  
2-methyl-2-propenoate, 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,1  
5.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate and methyl  
2-methyl-2-propenoate (9CI) (CA INDEX NAME)

CM 1

CRN 169391-91-7

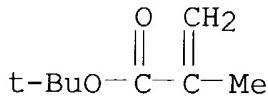
CMF C42 H74 O14 Si8



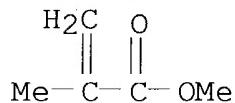
CM 2

CRN 585-07-9

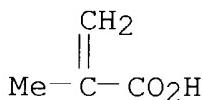
CMF C8 H14 O2



CM 3

CRN 80-62-6  
CMF C5 H8 O2

CM 4

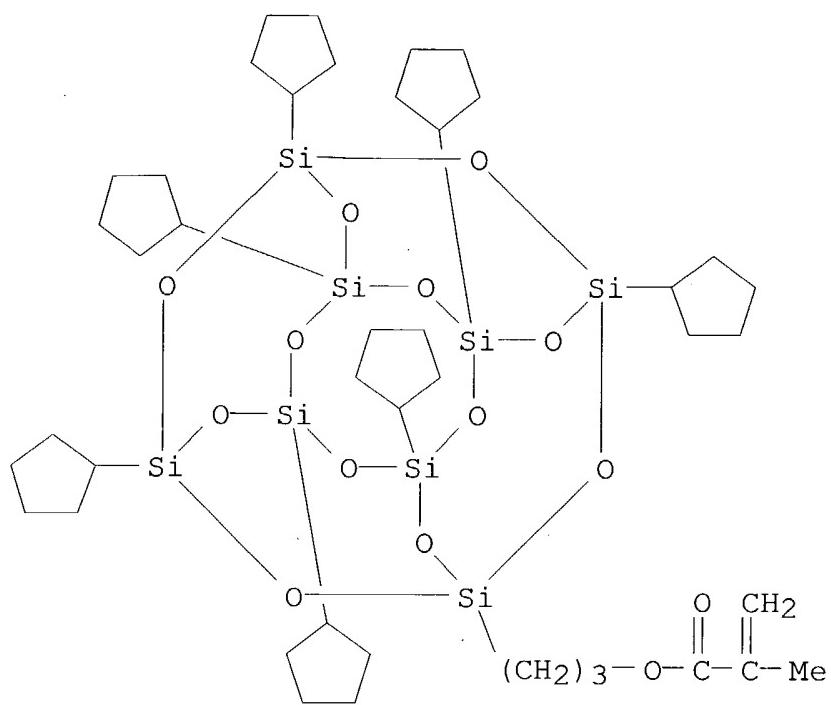
CRN 79-41-4  
CMF C4 H6 O2

RN 362675-17-0 HCA

CN Sulfonium, dimethyl[4-[(2-methyl-1-oxo-2-propenyl)oxy]phenyl]-, salt with trifluoromethanesulfonic acid (1:1), polymer with dihydro-3-methylene-2,5-furandione, 1,1-dimethylethyl 2-methyl-2-propenoate, 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,1 5.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate and methyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

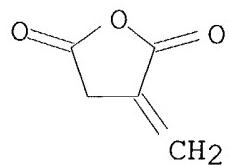
CM 1

CRN 169391-91-7  
CMF C42 H74 O14 Si8



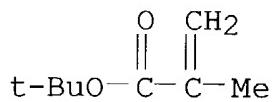
CM 2

CRN: 2170-03-8  
 CMF C5 H4 O3

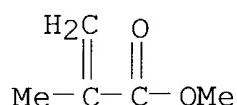


CM 3

CRN 585-07-9  
 CMF C8 H14 O2



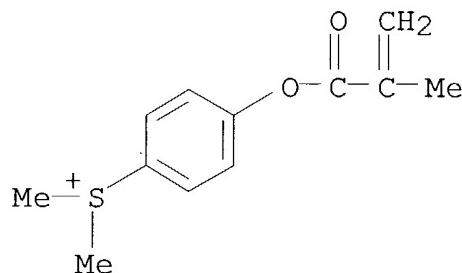
CM 4

CRN 80-62-6  
CMF C5 H8 O2

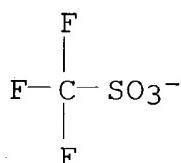
CM 5

CRN 352455-54-0  
CMF C12 H15 O2 S . C F3 O3 S

CM 6

CRN 141718-72-1  
CMF C12 H15 O2 S

CM 7

CRN 37181-39-8  
CMF C F3 O3 S

CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

ST silica nanoparticle modified ZEP520 lithog **resist**

- proximity effect redn; org inorg nanocomposite lithog **resist**  
proximity effect redn; silsesquioxane methacrylate polymer lithog  
**resist** proximity effect redn
- IT Sputtering  
(etching, reactive; lithog. **resists** with improved  
reactive ion etching resistance from methacrylate copolymers  
contg. oligosilsesquioxane pendant)
- IT Silsesquioxanes  
(lithog. **resists** with improved reactive ion etching  
resistance from methacrylate copolymers contg.  
oligosilsesquioxane pendant)
- IT Hybrid organic-inorganic materials  
Proximity effect  
(org./inorg. nanocomposite lithog. **resist** with reduced  
proximity effect)
- IT Electron beam **resists**  
**Resists**  
(silica nanoparticle-modified ZEP520 nanocomposite lithog.  
**resist** with reduced proximity effect)
- IT Etching  
(sputter, reactive; lithog. **resists** with improved  
reactive ion etching resistance from methacrylate copolymers  
contg. oligosilsesquioxane pendant)
- IT 43127-35-1, ZEP520  
(ZEP520; silica nanoparticle-modified ZEP520 nanocomposite  
lithog. **resist** with reduced proximity effect)
- IT 352455-54-0D, polymers **359408-40-5 362675-17-0**  
(lithog. **resists** with improved reactive ion etching  
resistance from methacrylate copolymers contg.  
oligosilsesquioxane pendant)
- IT 75-73-0, Carbon tetrafluoride 7782-44-7, Oxygen, uses  
(plasma; lithog. **resists** with improved reactive ion  
etching resistance from methacrylate copolymers contg.  
oligosilsesquioxane pendant)
- IT 7631-86-9, Silica, properties  
(silica nanoparticle-modified ZEP520 nanocomposite lithog.  
**resist** with reduced proximity effect)

L11 ANSWER 14 OF 18 HCA COPYRIGHT 2004 ACS on STN

135:233765 Incorporation of polyhedral oligosilsesquioxane in chemically amplified **resists** to improve their reactive ion etching resistance. Wu, Hengpeng; Hu, Yongqi; Gonsalves, Kenneth E.; Yacaman, Miguel Jose (Polymer Program at the Institute of Materials Science and Department of Chemistry, University of Connecticut, Storrs, CT, 06269, USA). Journal of Vacuum Science & Technology, B: Microelectronics and Nanometer Structures, 19(3), 851-855 (English) 2001. CODEN: JVTBD9. ISSN: 0734-211X. Publisher: American Institute of Physics.

AB A chem. amplified (CA) methacrylate **resist** contg. polyhedral oligosilsesquioxane (POSS) has been synthesized by AIBN-initiated free radical polymn. While the polymer of low POSS concns. showed little improvement in reactive ion etching (RIE) resistance, incorporation of 20.5 wt.% of the POSS monomer into methacrylate-based CA **resists** significantly improved their RIE resistance in the O<sub>2</sub> plasma. High-resoln. transmission electron microscopy revealed that the RIE resistance improvement was due to the formation of rectangular crystallite-constituting networks of the silica cages uniformly distributed within the polymer matrix.

IT 359408-40-5P

(incorporation of polyhedral oligosilsesquioxane in chem. amplified **resists** to improve their reactive ion etching resistance)

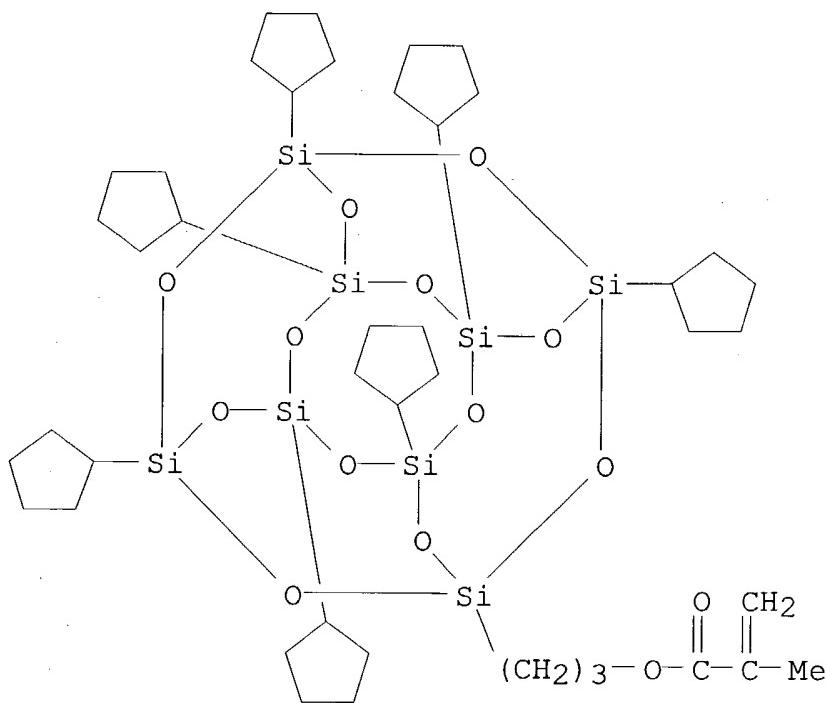
RN 359408-40-5 HCA

CN 2-Propenoic acid, 2-methyl-, polymer with 1,1-dimethylethyl 2-methyl-2-propenoate, 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,1 5.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate and methyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

CM 1

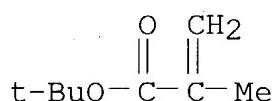
CRN 169391-91-7

CMF C42 H74 O14 Si8



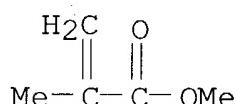
CM 2

CRN 585-07-9  
 CMF C8 H14 O2



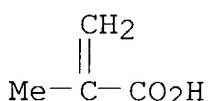
CM 3

CRN 80-62-6  
 CMF C5 H8 O2



CM 4

CRN 79-41-4  
 CMF C4 H6 O2



CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

Section cross-reference(s): 38

ST chem amplified polymer **resist** polyhedral silsesquioxane ion etching resistance; **photoresist** polymer polyhedral silsesquioxane improved ion etching resistance

IT **Photoresists**

(chem. amplified; incorporation of polyhedral oligosilsesquioxane in chem. amplified **resists** to improve their reactive ion etching resistance)

IT Sputtering

(etching, reactive; incorporation of polyhedral oligosilsesquioxane in chem. amplified **resists** to improve their reactive ion etching resistance)

IT Photolithography

- (incorporation of polyhedral oligosilsesquioxane in chem. amplified **resists** to improve their reactive ion etching resistance)
- IT Silsesquioxanes  
(incorporation of polyhedral oligosilsesquioxane in chem. amplified **resists** to improve their reactive ion etching resistance)
- IT Etching  
(sputter, reactive; incorporation of polyhedral oligosilsesquioxane in chem. amplified **resists** to improve their reactive ion etching resistance)
- IT 75-59-2, Tetramethylammonium hydroxide  
(developer; incorporation of polyhedral oligosilsesquioxane in chem. amplified **resists** to improve their reactive ion etching resistance)
- IT 78-67-1, Azobis(isobutyronitrile) 169391-91-7  
(in prepn. of chem. amplified (CA) methacrylate **resist** contg. polyhedral oligosilsesquioxane)
- IT 359408-40-5P  
(incorporation of polyhedral oligosilsesquioxane in chem. amplified **resists** to improve their reactive ion etching resistance)
- IT 72145-62-1, tert-Butyl methacrylate-methacrylic acid-methyl methacrylate copolymer  
(incorporation of polyhedral oligosilsesquioxane in chem. amplified **resists** to improve their reactive ion etching resistance)
- IT 57840-38-7, Triphenyl sulfonium hexafluoroantimonate  
(photoacid generator; incorporation of polyhedral oligosilsesquioxane in chem. amplified **resists** to improve their reactive ion etching resistance)

L11 ANSWER 15 OF 18 HCA COPYRIGHT 2004 ACS on STN

135:160082 Novel positive-tone chemically amplified **resists** with photoacid generator in the polymer chains. Wu, Hengpeng; Gonsalves, Kenneth E. (Polymer Program at the Institute of Materials Science and Department of Chemistry, University of Connecticut, Storrs, CT, 06269, USA). Advanced Materials (Weinheim, Germany), 13(9), 670-672 (English) 2001. CODEN: ADVMEW. ISSN: 0935-9648. Publisher: Wiley-VCH Verlag GmbH.

AB A sulfonium photoacid generating monomer was synthesized using a four-step synthesis scheme. This PAG monomer was successfully incorporated into methacrylate based chem. amplified **resists** by free radical copolymer. The **resists** were found to exhibit excellent film formation behavior due to absence of phase sepns., and extremely high sensitivity owing to high PAG loading in the polymer chain. Lithog. properties of the **resists** were also evaluated under both 248 nm and 20 keV electron radiation.

High sensitivity also affords these **resists** as potential candidates for low voltage EB lithog.

IT 352455-55-1P  
 (prep. and lithog. application of methacrylate based chem.  
 amplified **resists** comprising sulfonium photoacid  
 generating monomer)

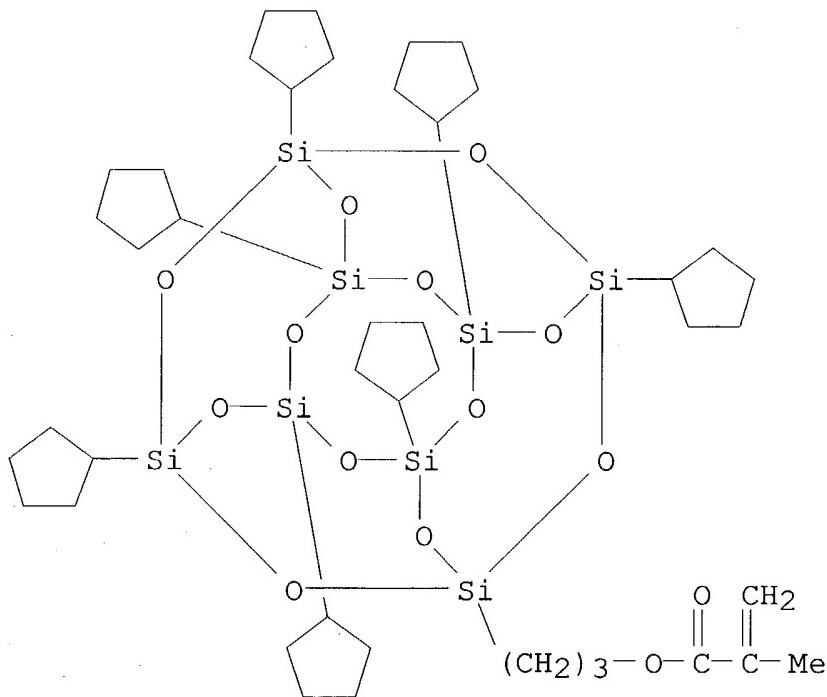
RN 352455-55-1 HCA

CN Sulfonium, dimethyl[4-[(2-methyl-1-oxo-2-propenyl)oxy]phenyl]-, salt with trifluoromethanesulfonic acid (1:1), polymer with 1,1-dimethylethyl 2-methyl-2-propenoate and 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

CM 1

CRN 169391-91-7

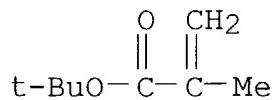
CMF C42 H74 O14 Si8



CM 2

CRN 585-07-9

CMF C8 H14 O2



CM 3

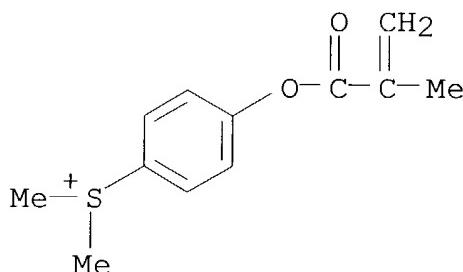
CRN 352455-54-0

CMF C12 H15 O2 S . C F3 O3 S

CM 4

CRN 141718-72-1

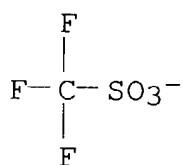
CMF C12 H15 O2 S



CM 5

CRN 37181-39-8

CMF C F3 O3 S



CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

ST sulfonium photoacid generating monomer pos chem amplified  
**resist; photoresist** DUV electron beam lithog  
 sulfonium photoacid generating monomer

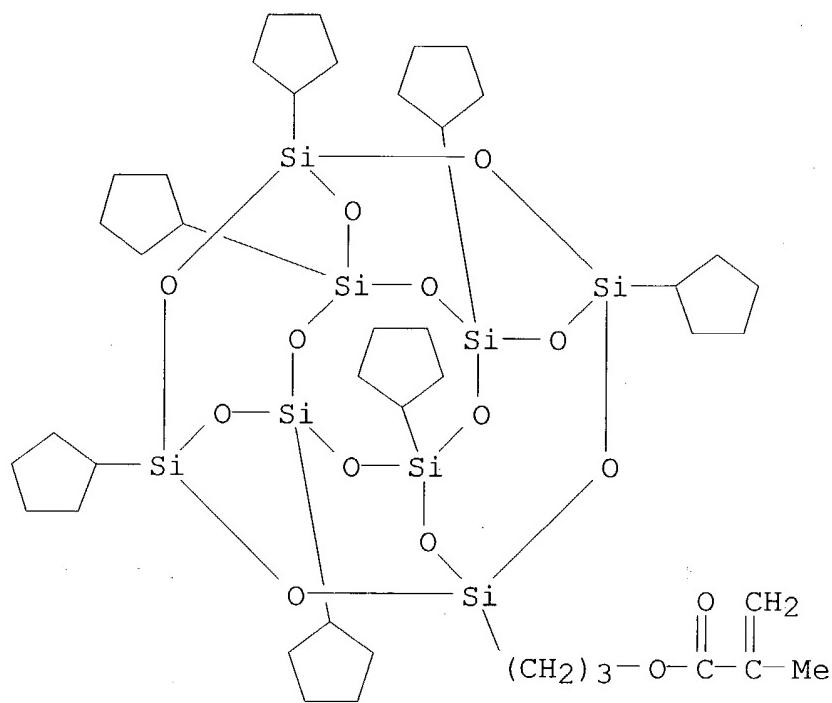
IT Photolithography  
**Positive photoresists**  
 (prepn. and lithog. application of methacrylate based chem.)

- amplified **resists** comprising sulfonium photoacid generating monomer)
- IT 75-59-2, Tetramethylammonium hydroxide  
(developer; prepn. and lithog. application of methacrylate based chem. amplified **resists** comprising sulfonium photoacid generating monomer)
- IT 352455-55-1P  
(prepn. and lithog. application of methacrylate based chem. amplified **resists** comprising sulfonium photoacid generating monomer)
- IT 352455-54-0P  
(prepn. and lithog. application of methacrylate based chem. amplified **resists** comprising sulfonium photoacid generating monomer)
- L11 ANSWER 16 OF 18 HCA COPYRIGHT 2004 ACS on STN  
133:315501 Polymer-inorganic high contrast and high sensitivity  
**resists** for nanolithography. Wu, Hengpeng; Wang, Jianzhao;  
Gonsalves, Kenneth E. (Polymer Program at the Institute of Materials  
Science, U-3136 & Department of Chemistry, University of  
Connecticut, Storrs, CT, 06269-3136, USA). Materials Research  
Society Symposium Proceedings, 584(Materials Issues and Modeling for  
Device Nanofabrication), 121-128 (English) 2000. CODEN: MRSPDH.  
ISSN: 0272-9172. Publisher: Materials Research Society.
- AB Polyhedral oligo-silsesquioxane methacrylate (POSSMA)/methyl  
methacrylate(MMA)/tert-Bu methacrylate(TBMA)/CMe<sub>3</sub> acrylate(TBA)  
copolymers were synthesized by soln. polymn. Their preliminary  
lithog.-related properties were studied. The mass ratio of  
MMA/POSSMA, 85.8/14.2, leads to an x-ray **resist** with a  
high contrast of 23.5 without sacrificing the sensitivity(1350  
mJ/cm<sup>2</sup>) which remains comparable to that of std. PMMA. By careful  
manipulation of components and compns., this generic type of polymer  
could potentially be used as a DUV or e-beam **resist** as  
well.
- IT 302347-58-6 302347-59-7 302347-60-0  
(polymer-inorg. high contrast and high sensitivity  
**resists** for nanolithog.)
- RN 302347-58-6 HCA
- CN 2-Propenoic acid, 2-methyl-, 3-(heptacyclopentylpentacyclo[9.5.1.13,  
9.15,15.17,13]octasiloxanyl)propyl ester, polymer with methyl  
2-methyl-2-propenoate (9CI) (CA INDEX NAME)

CM 1

CRN 169391-91-7

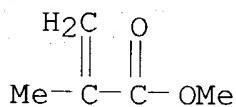
CMF C42 H74 O14 Si8



CM 2

CRN 80-62-6

CMF C5 H8 O2



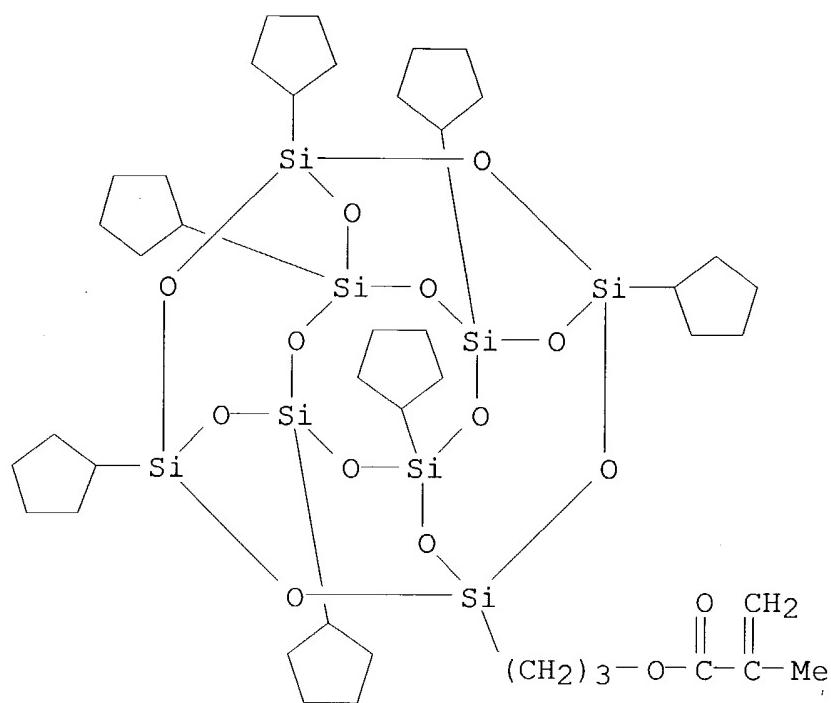
RN 302347-59-7 HCA

CN 2-Propenoic acid, 2-methyl-, 1,1-dimethylethyl ester, polymer with  
 3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate and methyl 2-methyl-2-propenoate (9CI)  
 (CA INDEX NAME)

CM 1

CRN 169391-91-7

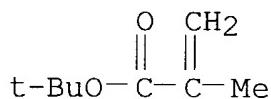
CMF C42 H74 O14 Si8



CM 2

CRN 585-07-9

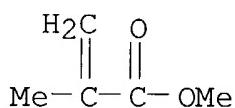
CMF C8 H14 O2



CM 3

CRN 80-62-6

CMF C5 H8 O2



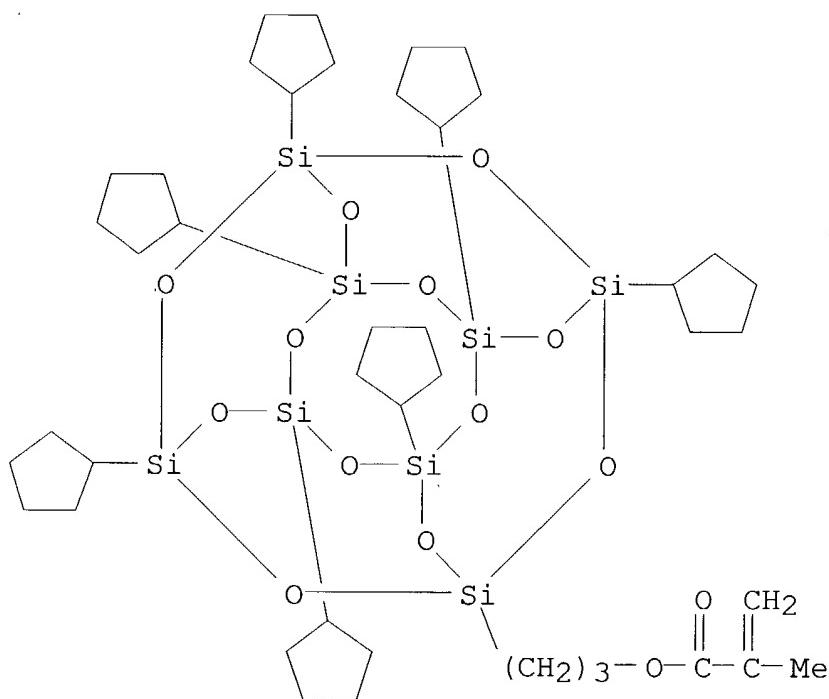
RN 302347-60-0 HCA

CN 2-Propenoic acid, 2-methyl-, 1,1-dimethylethyl ester, polymer with

3-(heptacyclopentylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

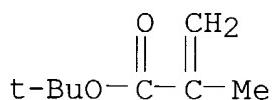
CM 1

CRN 169391-91-7  
CMF C42 H74 O14 Si8



CM 2

CRN 585-07-9  
CMF C8 H14 O2



CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

ST polymer contrast **resist** nanolithog polysilsesquioxane

IT Lithography

X-ray **resists**

(polymer-inorg. high contrast and high sensitivity)

resists for nanolithog.)

- IT Polymers, uses  
Silsesquioxanes  
(polymer-inorg. high contrast and high sensitivity  
resists for nanolithog.)
- IT 302347-58-6 302347-59-7 302347-60-0  
(polymer-inorg. high contrast and high sensitivity  
resists for nanolithog.)

L11 ANSWER 17 OF 18 HCA COPYRIGHT 2004 ACS on STN

126:256969 Comparative study of the characteristics of  
octavinylsilsesquioxane dry resist in ultraviolet-,  
electron-beam and x-ray exposure. Schmidt, A.; Babin, S.; Boehmer,  
K.; Koops, H. W. P. (Deutsche Telekom AG, Technologiezentrum, Am  
Kavallieriesand 3, Darmstadt, 64295, Germany). Microelectronic  
Engineering, 35(1-4, Micro- and Nano-Engineering 96), 129-132  
(English) 1997. CODEN: MIENEF. ISSN: 0167-9317. Publisher:  
Elsevier.

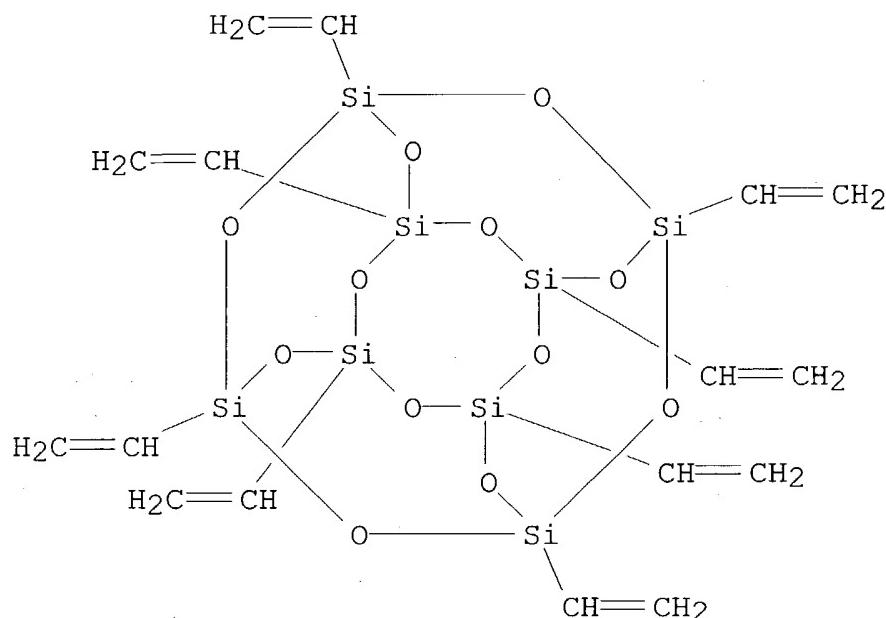
AB Fabrication techniques in microelectronics as well as in micro  
mechanics, micro optics and micro fluidics favor the application of  
a dry resist process due to environmental protection and  
reproducibility in the processing. The applicability of the dry,  
neg. tone resist using octavinylsilsesquioxane as a  
monomer unit is investigated by three different lithogs. Deep  
UV-lithog. with excimer laser radiation, electron-beam, and x-ray  
lithog. with synchrotron radiation is employed to measure the  
characteristics of this resist. For deep UV-lithog., the  
resist shows ablation which means a pos. action as well as  
polymn. for neg. action depending on the wavelength and the fluence  
range applied. Under electron beam and X-ray exposure the material  
acts as a neg. tone resist with high sensitivity and  
spatial resoln. The characteristic curves of the resist  
using the three lithogs. are presented.

IT 188356-58-3  
(comparative study of the characteristics of  
octavinylsilsesquioxane dry resist in UV-,  
electron-beam and x-ray exposure)

RN 188356-58-3 HCA  
CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, octaethenyl-,  
homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 69655-76-1  
CMF C16 H24 O12 Si8



CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

Section cross-reference(s): 37, 76

ST electron beam lithog octavinylsilsesquioxane dry **resist**; deep UV lithog octavinylsilsesquioxane dry **resist**; excimer laser lithog octavinylsilsesquioxane dry **resist**

IT Lithography

**Photoresists**

(comparative study of the characteristics of octavinylsilsesquioxane dry **resist** in UV-, electron-beam and x-ray exposure)

IT 69655-76-1, Octavinylsilsesquioxane

(V-T 8; comparative study of the characteristics of octavinylsilsesquioxane dry **resist** in UV-, electron-beam and x-ray exposure)

IT **188356-58-3**

(comparative study of the characteristics of octavinylsilsesquioxane dry **resist** in UV-, electron-beam and x-ray exposure)

L11 ANSWER 18 OF 18 HCA COPYRIGHT 2004 ACS on STN

126:231340 Methods for fabricating polymer films with three-dimensional structure for integrated optics. Koops, Hans W. P.; Babin, Sergey (Deutsche Telekom Ag, Germany). Ger. Offen. DE 19630705 A1 19970320, 4 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1996-19630705 19960730. PRIORITY: DE 1995-19531860 19950830.

AB The title methods entail forming a layer of a dry **resist**

which is polymerizable by irradn. (with light or ionizing radiation) on a support, irradiating the layer with a spatially and temporally specific dose by scanning with submicron precision in the desired pattern, and subsequently removing the resulting polymd. structure (e.g., a lens) from the unpolymd. dry **resist** using a dry process.

IT 188356-58-3

(dry methods for fabricating polymer films with three-dimensional structure for integrated optics)

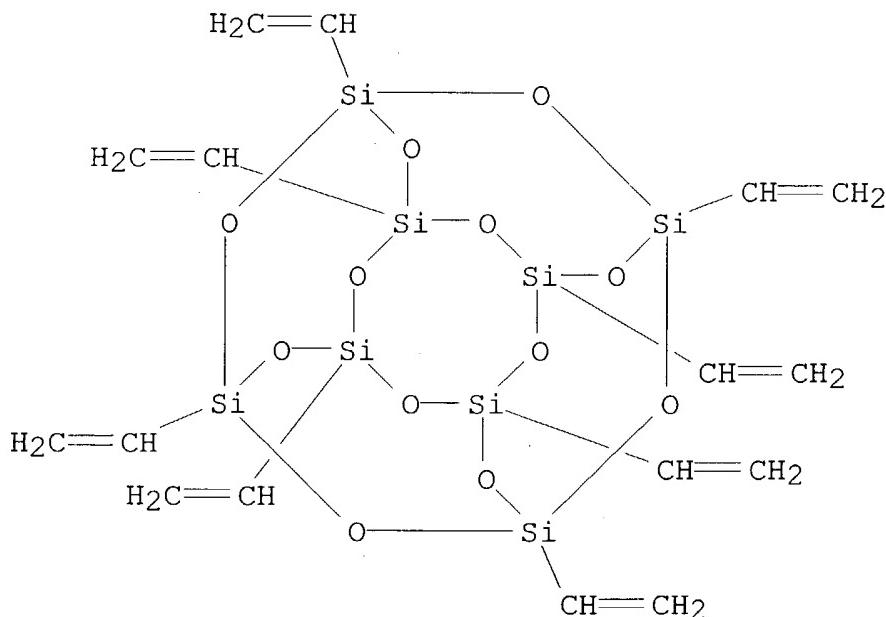
RN 188356-58-3 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, octaethenyl-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 69655-76-1

CMF C16 H24 O12 Si8



IC ICM G02B006-138

ICS G03F007-027; G03F007-36

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 74

IT **Photoresists**

(dry; dry methods for fabricating polymer films with three-dimensional structure for integrated optics)

IT 188356-58-3

(dry methods for fabricating polymer films with three-dimensional

structure for integrated optics)

=> d 126 1-4 cbib abs hitstr hitrn

L26 ANSWER 1 OF 4 HCA COPYRIGHT 2004 ACS on STN

140:255058 Resin compositions and cured products thereof with reduced shrinkage and warpage. Yokoshima, Minoru (Nippon Kayaku Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2004083626 A2 20040318, 18 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2002-242505 20020822.

AB The compns. comprise ethylenically unsatd. compds. and SiO<sub>2</sub> with cage structure. Thus, pentaerythritol triacrylate IPDI adduct (Kayarad PET 30I) 72.5, tetrahydrofurfuryl acrylate 8.1, methacryloyloxypropyl-contg. polyhedral oligomeric silsesquioxane (MA 0717) 80.6, Irgacure 184 6.5, and a 70:30 MEK/PhMe mixt. 45 parts were heated to 40° to give a compn., which was applied on a PET film, dried, and irradiated with UV to form a coating showing pencil hardness 5H, no curling, cross-cut adhesion 100/100, and good transparency.

IT **669776-27-6P**  
(acrylate-polyhedral silica compns. for hard coatings with reduced shrinkage and warpage)

RN 669776-27-6 HCA

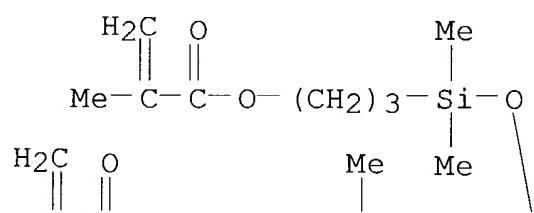
CN 2-Propenoic acid, 2-methyl-, pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane-1,3,5,7,9,11,13,15-octayloctakis[oxy(dimethylsilylene)-3,1-propanediyl] ester, polymer with 1-cyclohexyl-1H-pyrrole-2,5-dione and Kayarad DPRA 40H (9CI) (CA INDEX NAME)

CM 1

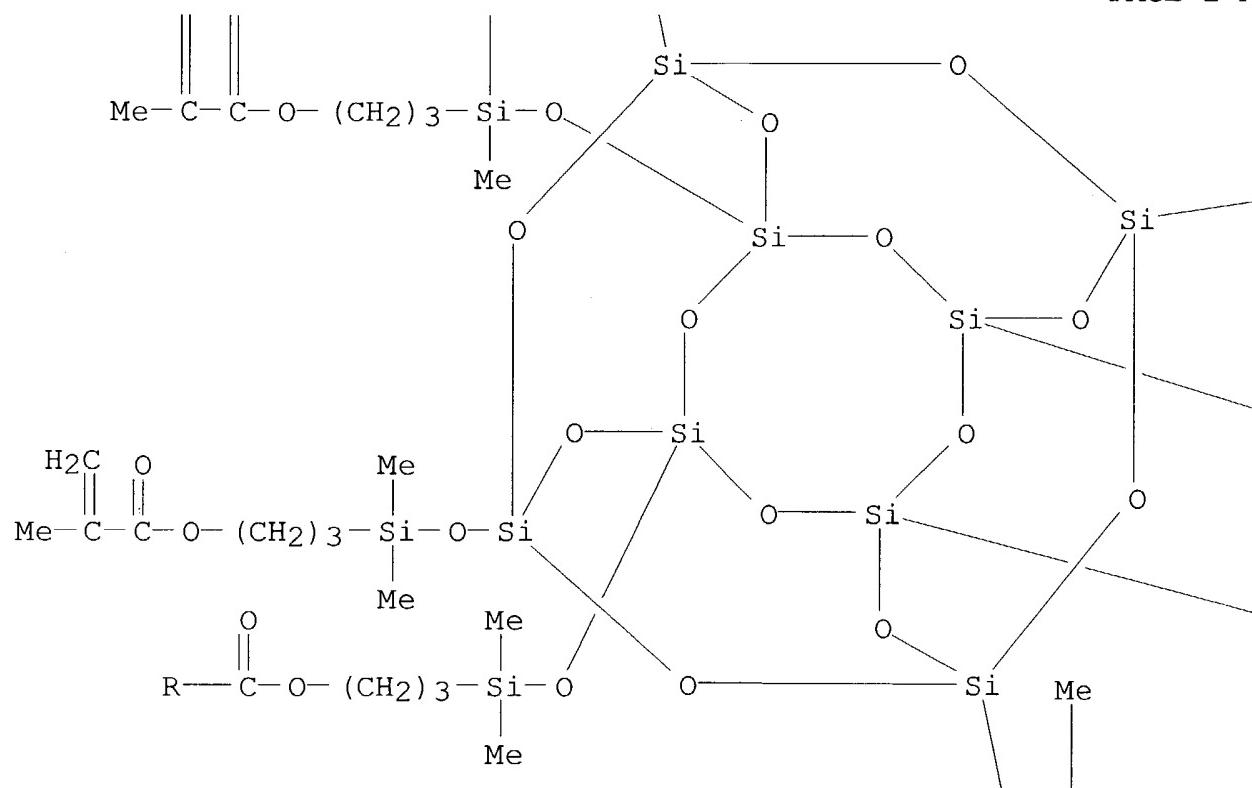
CRN 288290-34-6

CMF C72 H136 O36 Si16

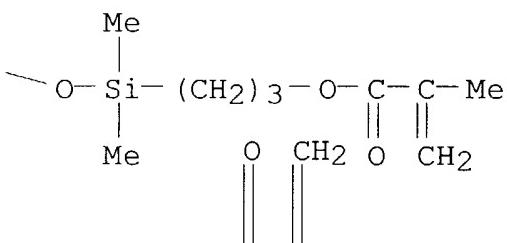
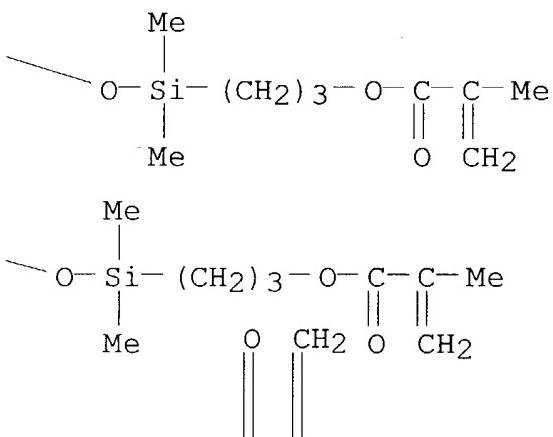
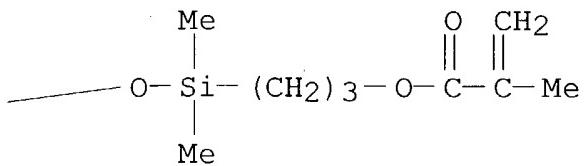
PAGE 1-A



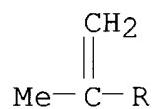
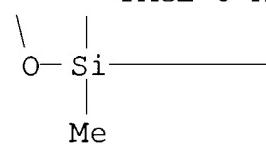
PAGE 2-A



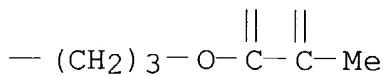
PAGE 2-B



PAGE 3-A



PAGE 3-B



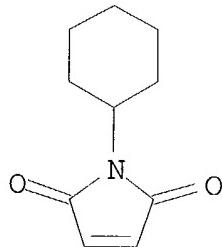
CM 2

CRN 176633-58-2  
 CMF Unspecified  
 CCI MAN

\*\*\* STRUCTURE DIAGRAM IS NOT AVAILABLE \*\*\*

CM 3

CRN 1631-25-0  
 CMF C10 H13 N O2



IT 669776-27-6P

(acrylate-polyhedral silica compns. for hard coatings with reduced shrinkage and warpage)

L26 ANSWER 2 OF 4 HCA COPYRIGHT 2004 ACS on STN

138:14196 Glass transition temperatures of poly(hydroxystyrene-co-vinylpyrrolidone-co-isobutylstyryl polyhedral oligosilsesquioxanes). Xu, Hongyao; Kuo, Shiao-Wei; Lee, Juh-Shyong; Chang, Feng-Chih (Institute of Applied Chemistry, National Chiao-Tung University, Hsin-Chu, 30043, Taiwan). Polymer, 43(19), 5117-5124 (English) 2002. CODEN: POLMAG. ISSN: 0032-3861. Publisher: Elsevier Science Ltd..

AB A series of poly(hydroxystyrene-co-vinylpyrrolidone-co-isobutylstyryl polyhedral oligosilsesquioxanes) (PHS-PVP-POSS) hybrid polymers with various POSS contents was prep'd. by free radical copolymer. of acetoxyxystyrene, vinylpyrrolidone with styrylisobutyl polyhedral oligosilsesquioxanes (POSS), followed by selective removal of the acetyl protective group. The POSS content of a hybrid polymer can be effectively controlled by varying the

feed ratios of reactants. The Tg of the POSS hybrid increases with the POSS content of PHS-PVP-POSS hybrids. The mechanism of Tg enhancement in these PHS-PVP-POSS hybrids was investigated using DSC, FTIR and GPC. The formation of the phys. cross-linked POSS in these hybrid polymers tends to restrict polymer chain motion and results in significant Tg increase.

IT 477782-46-0DP, deacetylated 477782-46-0P  
(prepn. and glass temp. of)

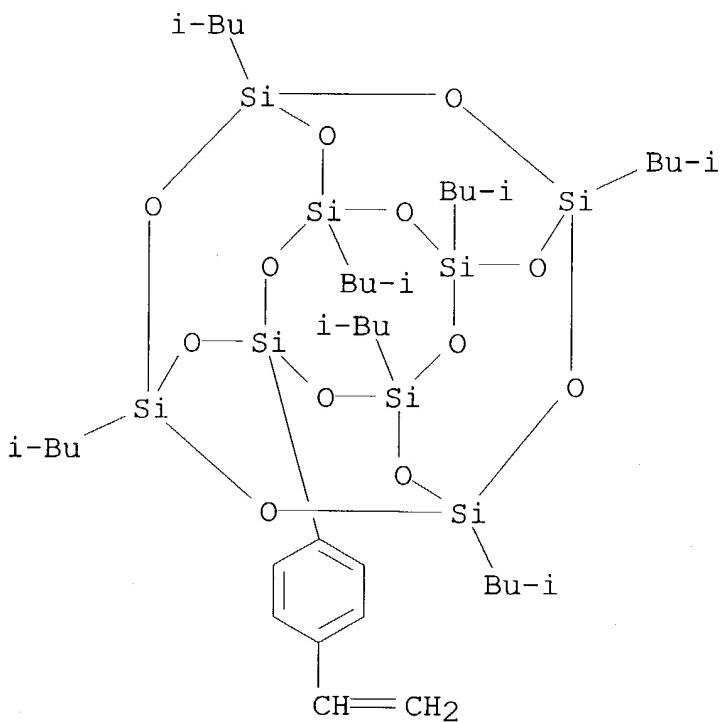
RN 477782-46-0 HCA

CN 2-Pyrrolidinone, 1-ethenyl-, polymer with 4-ethenylphenyl acetate and (4-ethenylphenyl)heptakis(2-methylpropyl)pentacyclo[9.5.1.13,9.1 5,15.17,13]octasiloxane (9CI) (CA INDEX NAME)

CM 1

CRN 446276-27-3

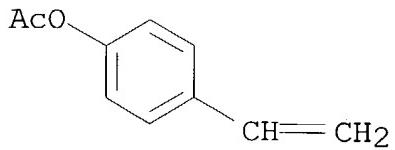
CMF C36 H70 O12 Si8



CM 2

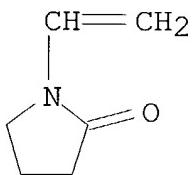
CRN 2628-16-2

CMF C10 H10 O2



CM 3

CRN 88-12-0

CMF C<sub>6</sub> H<sub>9</sub> N O

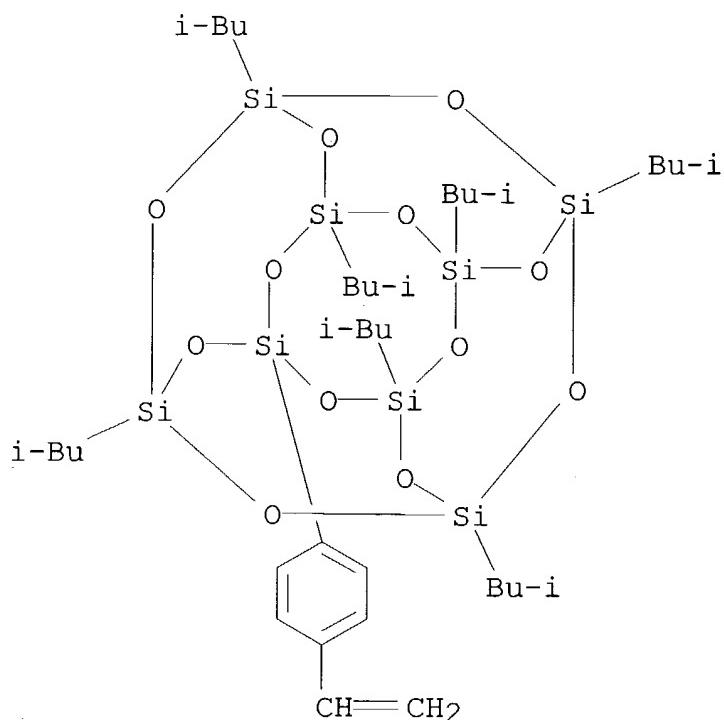
RN 477782-46-0 HCA

CN 2-Pyrrolidinone, 1-ethenyl-, polymer with 4-ethenylphenyl acetate  
and (4-ethenylphenyl)heptakis(2-methylpropyl)pentacyclo[9.5.1.13,9.1  
5,15.17,13]octasiloxane (9CI) (CA INDEX NAME)

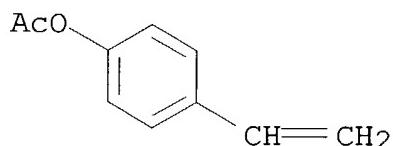
CM 1

CRN 446276-27-3

CMF C<sub>36</sub> H<sub>70</sub> O<sub>12</sub> Si<sub>8</sub>

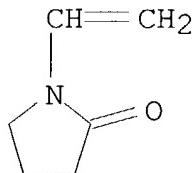


CM 2

CRN 2628-16-2  
CMF C10 H10 O2

CM 3

CRN 88-12-0  
CMF C6 H9 N O



IT **477782-46-0DP**, deacetylated **477782-46-0P**  
(prepn. and glass temp. of)

L26 ANSWER 3 OF 4 HCA COPYRIGHT 2004 ACS on STN

137:385162 Preparations, Thermal Properties, and Tg Increase Mechanism of Inorganic/Organic Hybrid Polymers Based on Polyhedral Oligomeric Silsesquioxanes. Xu, Hongyao; Kuo, Shiao-Wei; Lee, Juh-Shyong; Chang, Feng-Chih (Department of Applied Chemistry, National Chiao-Tung University, Hsin Chu, Taiwan). Macromolecules, 35(23), 8788-8793 (English) 2002. CODEN: MAMOBX. ISSN: 0024-9297.  
Publisher: American Chemical Society.

AB A series of novel hybrid poly(acetoxystyrene-co-isobutylstyryl-POSS)s (PAS-POSS) and poly(vinylpyrrolidone-co-isobutylstyryl-POSS)s (PVP-POSS) was synthesized and characterized. The POSS content in these hybrids can be controlled by varying the monomer feed ratio. The polyhedral oligosilsesquioxane (POSS) moiety can effectively increase the Tg of the resultant org./inorg. hybrid polymer at a relatively high POSS content and produce the hybrid copolymer with narrower mol. wt. distribution. The FTIR spectra are used to investigate the structure-property relationship of these hybrid polymers, and the Tg enhancement mechanism is discussed in detail.

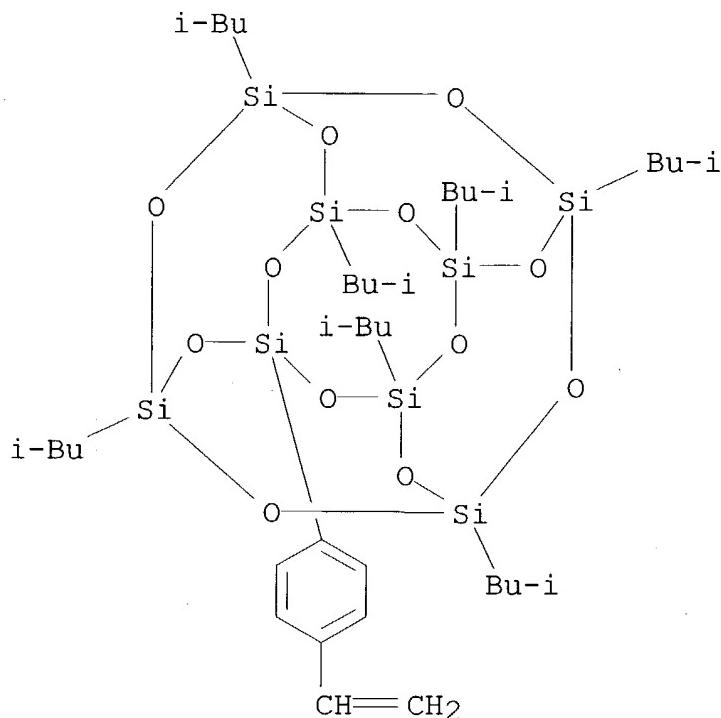
IT **476012-71-2P**  
(prepn. and glass temp. of)

RN 476012-71-2 HCA

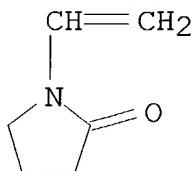
CN 2-Pyrrolidinone, 1-ethenyl-, polymer with (4-ethenylphenyl)heptakis(2-methylpropyl)pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane (9CI) (CA INDEX NAME)

CM 1

CRN 446276-27-3  
CMF C36 H70 O12 Si8



CM 2

CRN 88-12-0  
CMF C<sub>6</sub> H<sub>9</sub> N OIT 476012-71-2P  
(prep. and glass temp. of)

L26 ANSWER 4 OF 4 HCA COPYRIGHT 2004 ACS on STN  
 136:248253 Polymer hybrids of functionalized silsesquioxanes and organic polymers utilizing the sol-gel reaction of tetramethoxysilane. Kim, Kyung-Min; Adachi, Kaoru; Chujo, Yoshiki (Graduate School of Engineering, Department of Polymer Chemistry, Kyoto University, Yoshida, Sakyo-ku, Kyoto, 606-8501, Japan). Polymer, Volume Date 2002, 43(4), 1171-1175 (English) 2001. CODEN: POLMAG. ISSN: 0032-3861. Publisher: Elsevier Science Ltd..

AB The ternary polymer hybrids were prep'd. by org. polymers such as poly(2-methyl-2-oxazoline) (POZO) or poly(N-vinylpyrrolidone) (PVP) and aminopropylsilsesquioxane (Cube-aminopropyl) utilizing the sol-gel reaction of tetramethoxysilane (TMOS). The prep'd. polymer hybrids were characterized by IR, thermogravimetric anal. (TGA), X-ray diffraction (XRD), <sup>1</sup>H NMR, SEM, etc. In this hybrid system, hydrogen-bonding interactions played a crit. role in the formation of the transparent polymer hybrids. Polymer hybrids using POZO showed high transparency and homogeneity in a wide range of the feed ratios of POZO to Cube-aminopropyl. On the other hand, in case of polymer hybrids using PVP, higher Cube-aminopropyl ratio brought about the phase sepn., indicating the aggregation of the Cube-aminopropyl itself. The homogeneity of ternary polymer hybrids was found to be closely dependent on the difference between strength of hydrogen bonding interaction of polymer and residual silanol groups of silica gel and strength of that of polymer and Cube-aminopropyl. It is also obsd. that initial decompn. temp. of polymer hybrids was increased with increasing the Cube-aminopropyl ratio.

IT **403832-77-9P**

(polymer hybrids of (aminopropyl)triethoxysilane octamer silsesquioxane and org. polymers utilizing sol-gel reaction of tetramethoxysilane)

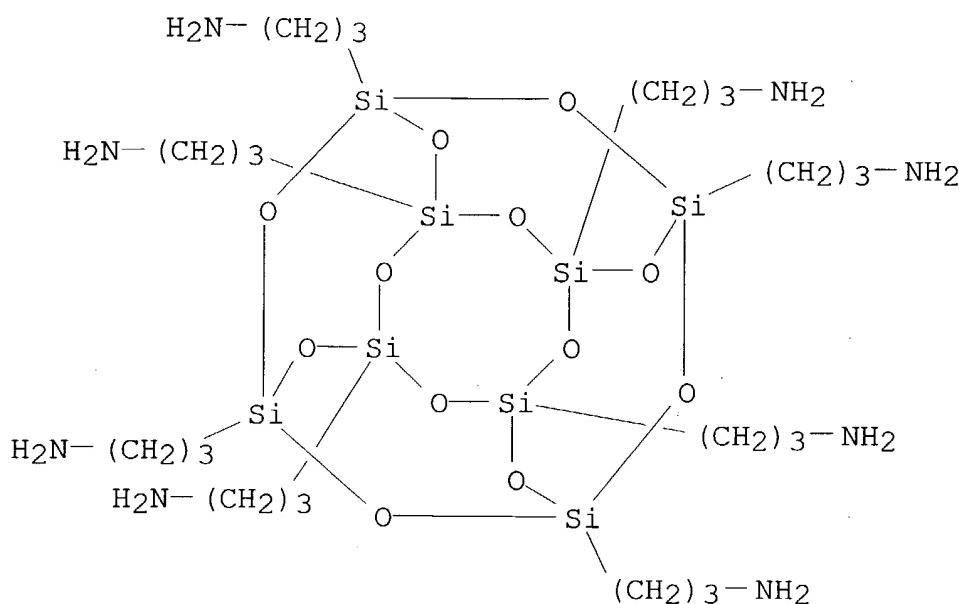
RN 403832-77-9 HCA

CN Silicic acid (H<sub>4</sub>SiO<sub>4</sub>), tetramethyl ester, polymer with 1-ethenyl-2-pyrrolidinone and pentacyclo[9.5.1.13,9.15,15.17,13]octa siloxaneoctapropanamine (9CI) (CA INDEX NAME)

CM 1

CRN 150380-11-3

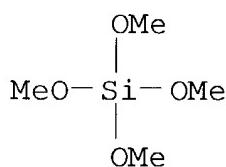
CMF C24 H64 N8 O12 Si8



CM 2

CRN 681-84-5

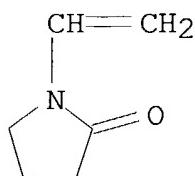
CMF C4 H12 O4 Si



CM 3

CRN 88-12-0

CMF C6 H9 N O



IT 403832-77-9P

(polymer hybrids of (aminopropyl)triethoxysilane octamer silsesquioxane and org. polymers utilizing sol-gel reaction of tetramethoxysilane)

=> => d 127 4,8,12,16,20 cbib abs hitstr hitrn

L27 ANSWER 4 OF 20 HCA COPYRIGHT 2004 ACS on STN

137:338540 Nanostructured Polyethylene-POSS Copolymers: Control of Crystallization and Aggregation. Waddon, A. J.; Zheng, L.; Farris, R. J.; Coughlin, E. Bryan (Department of Polymer Science and Engineering, University of Massachusetts, Amherst, MA, 01003, USA). Nano Letters, 2(10), 1149-1155 (English) 2002. CODEN: NALEFD. ISSN: 1530-6984. Publisher: American Chemical Society.

AB Nanoscale structure formation in copolymers of polyethylene (PE) and polyhedral oligomeric silsesquioxane (POSS) with norbornene and cyclopentyl side-groups can be controlled through choice of crystn. conditions. Aggregates of both cryst. PE and cryst. POSS are found when crystd. from the melt. A self-assembled, two-phase cryst. structure, consisting of POSS cryst. domains molecularly connected to PE cryst. domains, is formed. Constraints on domain growth arise from mol. architecture, likely leading to anisotropy in the shape of POSS domains. Considerable suppression of POSS crystn. is found on pptn. from soln. The origin of the frustration of crystal growth and the introduction of disorder is discussed. Structural investigative methods include X-ray diffraction and transmission electron microscopy. Degrdrn. temps. are found to be dependent on the morphol. of the nanocomposites, with possible implications for improved thermal resistance.

IT 301538-84-1P  
(control of crystn. and aggregation of nanostructured)

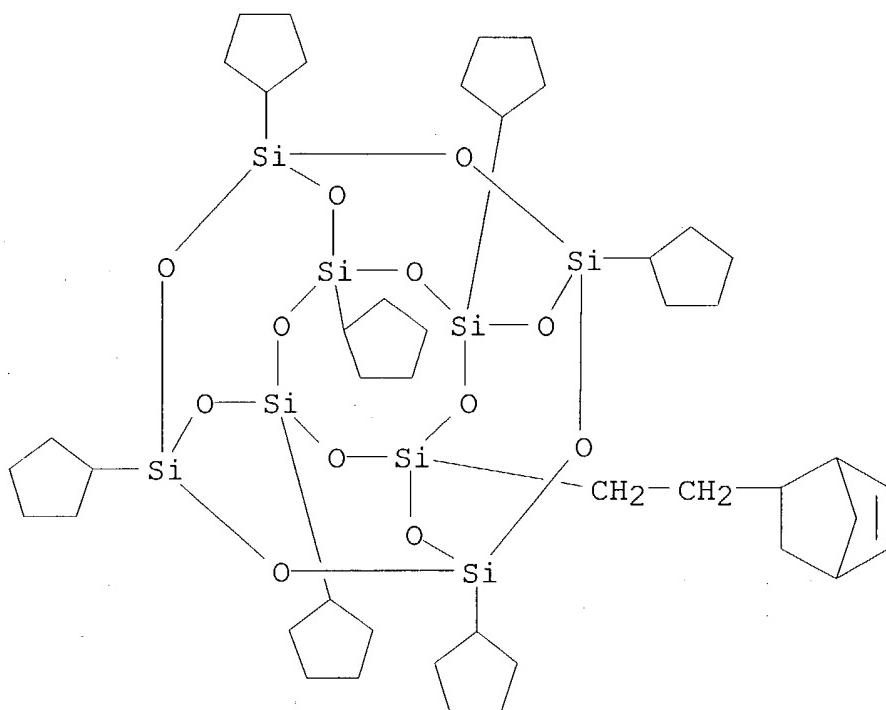
RN 301538-84-1 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, (2-bicyclo[2.2.1]hept-5-en-2-ylethyl)heptacyclopentyl-, polymer with ethene (9CI) (CA INDEX NAME)

CM 1

CRN 188859-53-2

CMF C44 H76 O12 Si8



CM 2

CRN 74-85-1

CMF C2 H4

H<sub>2</sub>C=CH<sub>2</sub>

IT 301538-84-1P

(control of crystn. and aggregation of nanostructured)

L27 ANSWER 8 OF 20 HCA COPYRIGHT 2004 ACS on STN

135:331768 Synthesis of polyethylene hybrid copolymers containing polyhedral oligomeric silsesquioxane prepared with ring-opening metathesis copolymerization. Zheng, Lei; Farris, Richard J.; Coughlin, E. Bryan (Polymer Science and Engineering Department, University of Massachusetts, Amherst, MA, 01003, USA). Journal of Polymer Science, Part A: Polymer Chemistry, 39(17), 2920-2928 (English) 2001. CODEN: JPACEC. ISSN: 0887-624X. Publisher: John Wiley & Sons, Inc..

AB Ring-opening metathesis copolymers of cyclooctene and the polyhedral oligomeric silsesquioxane (POSS) monomer 1-[2-(5-norbornen-2-yl)ethyl]-3,5,7,9,11,13,15-heptacyclopentacyclo[9.5.1.13,9.15,

15.17,13] octasiloxane (POSS-norbornylene) were performed with Grubb's catalyst, RuCl<sub>2</sub>(=CHPh)(PCy<sub>3</sub>)<sub>2</sub>. Random copolymers were formed and fully characterized with POSS loadings as high as 55 wt %. Diimide redn. of these copolymers afforded polyethylene-POSS random copolymers. Thermogravimetric anal. of the polyethylene-POSS copolymers under air showed a 70°C improvement, relative to a polyethylene control sample of similar mol. wt., in the onset of decompn. temp. based on 5% mass loss. The homopolymer of POSS-norbornylene was also synthesized. This polymer had a rigid backbone according to <sup>1</sup>H NMR evidence of broad olefinic signals.

IT 349490-72-8P

(prepn. and characterization of)

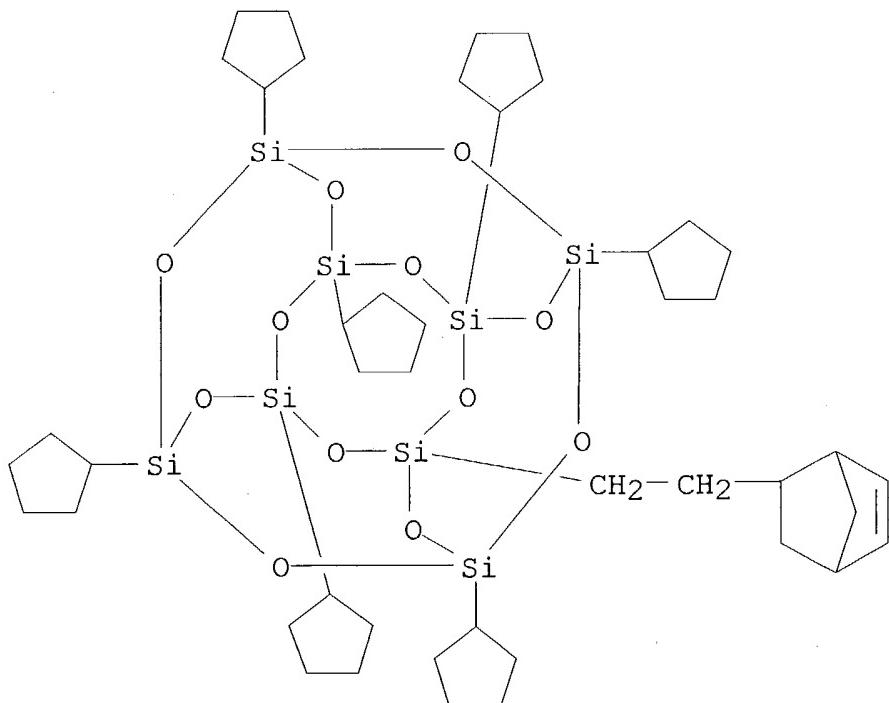
RN 349490-72-8 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, (2-bicyclo[2.2.1]hept-5-en-2-ylethyl)heptacyclopentyl-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 188859-53-2

CMF C44 H76 O12 Si8



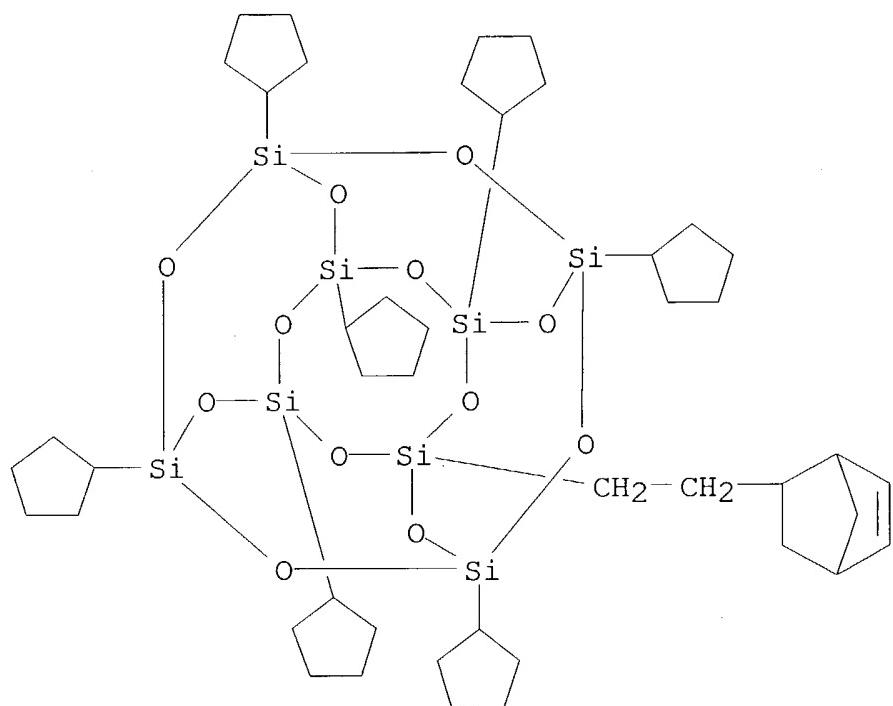
IT 301538-83-0DP, hydrogenated 301538-83-0P  
(prepn. and properties of)

RN 301538-83-0 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, (2-bicyclo[2.2.1]hept-5-en-2-ylethyl)heptacyclopentyl-, polymer with cyclooctene (9CI) (CA INDEX NAME)

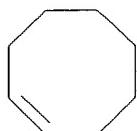
CM 1

CRN 188859-53-2  
CMF C44 H76 O12 Si8



CM 2

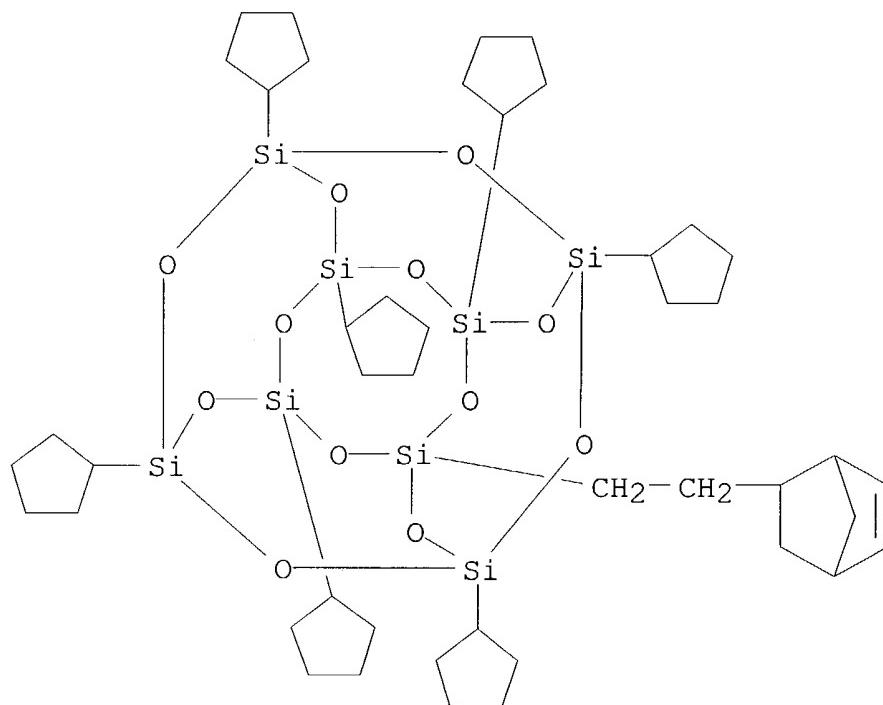
CRN 931-88-4  
CMF C8 H14



RN 301538-83-0 HCA  
CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, (2-bicyclo[2.2.1]hept-5-en-2-ylethyl)heptacyclopentyl-, polymer with cyclooctene (9CI) (CA INDEX NAME)

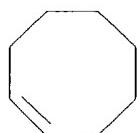
CM 1

CRN 188859-53-2  
 CMF C44 H76 O12 Si8



CM 2

CRN 931-88-4  
 CMF C8 H14



IT 349490-72-8P  
 (prepn. and characterization of)  
 IT 301538-83-0DP, hydrogenated 301538-83-0P  
 (prepn. and properties of)

L27 ANSWER 12 OF 20 HCA COPYRIGHT 2004 ACS on STN  
 134:73334 Porous gas permeable material for gas separation. Sammons,

Jack; Goddard, David M. (Gas Separation Technology, Inc., USA). PCT Int. Appl. WO 2000076634 A1 20001221, 69 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 2000-US15778 20000609. PRIORITY: US 1999-PV138581 19990611.

AB A gas separator, a method for producing the gas separator, and a method for sepg. gases based on a property of inelasticity of the gases. The inventive gas separator is a permeable porous material for sepg. a mixt. of gases by selectable pore size exclusion, comprising pores formed with at least one nanostructured compd. In other words, the inventive porous material can be used to sep. a mixt. of gases based upon the different working diam. of each of the gases. By selecting specific nanostructured compds., the porous material can be tailored to contain pores of a predetd. size which allow gases having a working diam. smaller than the size of the pores to pass through the material while preventing the passage of gases having a working diam. greater than the size of the pores.

IT **188859-55-4**

(porous gas permeable material for gas sepn.)

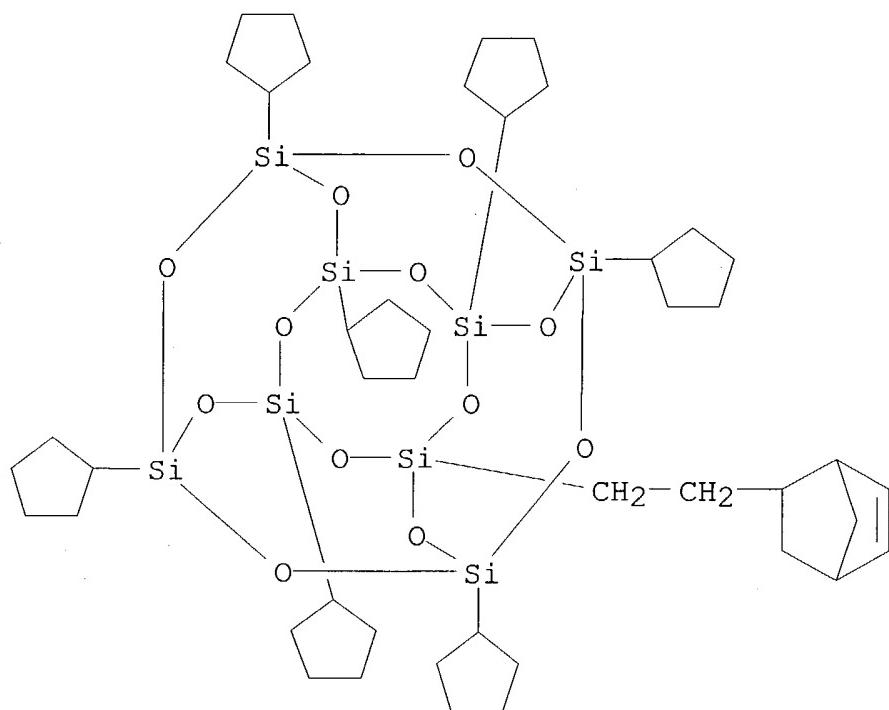
RN 188859-55-4 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, (2-bicyclo[2.2.1]hept-5-en-2-ylethyl)heptacyclopentyl-, polymer with bicyclo[2.2.1]hept-2-ene (9CI) (CA INDEX NAME)

CM 1

CRN 188859-53-2

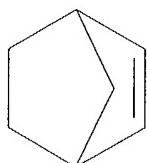
CMF C44 H76 O12 Si8



CM 2

CRN 498-66-8

CMF C7 H10



IT 188859-55-4

(porous gas permeable material for gas sepn.)

L27 ANSWER 16 OF 20 HCA COPYRIGHT 2004 ACS on STN

132:348081 Strain recovery in POSS hybrid thermoplastics. Mather,  
 Patrick T.; Jeon, Hong G.; Haddad, T. S. (Polymer Program, Institute  
 of Materials Science, University of Connecticut, Storrs, CT,  
 06269-3136, USA). Polymer Preprints (American Chemical Society,  
 Division of Polymer Chemistry), 41(1), 528-529 (English) 2000.  
 CODEN: ACPPAY. ISSN: 0032-3934. Publisher: American Chemical  
 Society, Division of Polymer Chemistry.

AB Polyhedral oligomeric silsesquioxane (POSS) macromer consist of a well-defined cluster inorg. silica-like core surrounded by org. corner groups only one being reactive for polymn. The goal is to develop compn.-microstructure and microstructure-property relationships for POSS materials with particular focus on mech. relaxation behavior. As such, we will report the microstructure and mech. properties of the polynorbornene-POSS copolymer system in which we have systematically varied the nonreactive corner group, R, and the mole fraction of POSS present in random copolymers. In particular, we will discuss interesting "shape-memory" behavior obstd. for drawn specimens and detail the impact of POSS incorporation on such characteristics as strain recovery, recovery rate, and retraction stability. The origin of shape-memory alteration with POSS incorporation is discussed with respect to nanostructures formed as revealed by transmission electron microscopy.

IT **188859-54-3 188859-55-4**

(mech. relaxation behavior of pendant polyhedral oligosilsesquioxane-contg. polynorbornene)

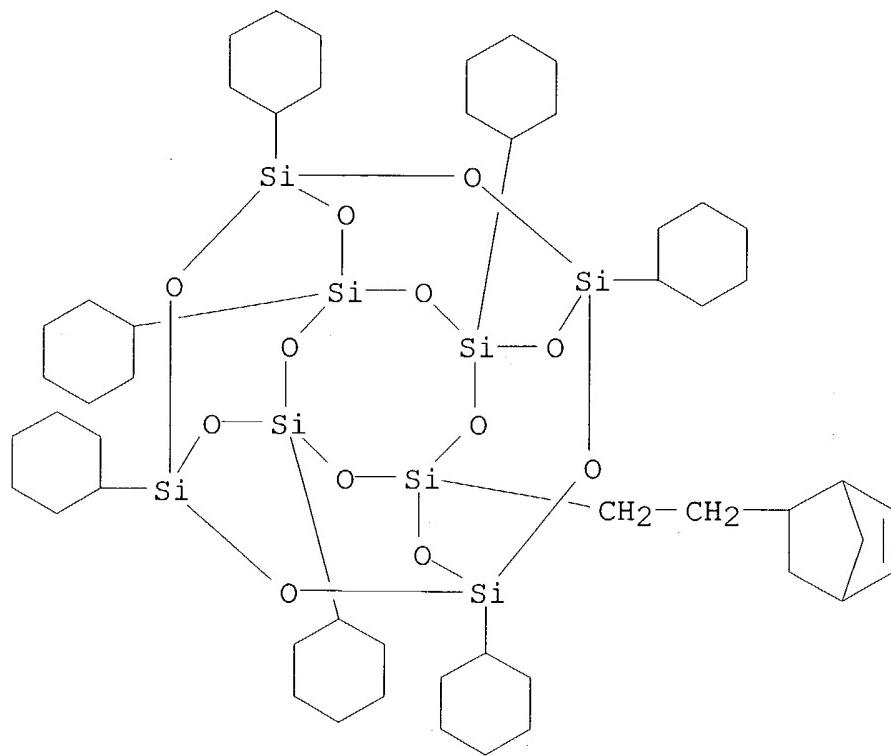
RN 188859-54-3 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, (2-bicyclo[2.2.1]hept-5-en-2-ylethyl)heptacyclohexyl-, polymer with bicyclo[2.2.1]hept-2-ene (9CI) (CA INDEX NAME)

CM 1

CRN 188859-52-1

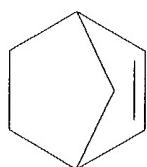
CMF C51 H90 O12 Si8



CM 2

CRN 498-66-8

CMF C7 H10



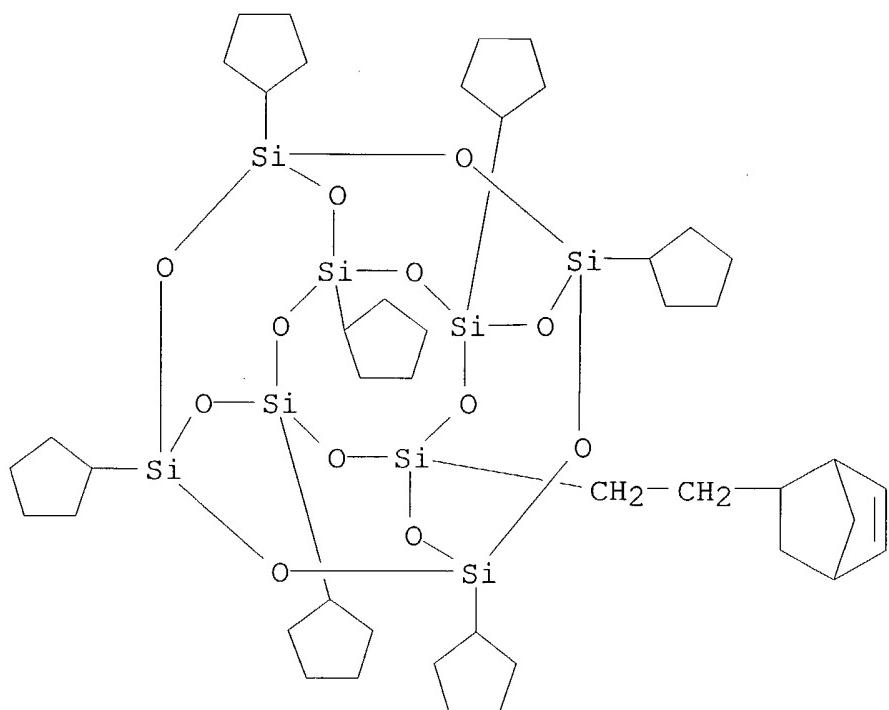
RN 188859-55-4 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, (2-bicyclo[2.2.1]hept-5-en-2-ylethyl)heptacyclopentyl-, polymer with bicyclo[2.2.1]hept-2-ene (9CI) (CA INDEX NAME)

CM 1

CRN 188859-53-2

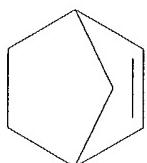
CMF C44 H76 O12 Si8



CM 2

CRN 498-66-8

CMF C7 H10



IT 188859-54-3 188859-55-4

(mech. relaxation behavior of pendant polyhedral oligosilsesquioxane-contg. polynorbornene)

L27 ANSWER 20 OF 20 HCA COPYRIGHT 2004 ACS on STN

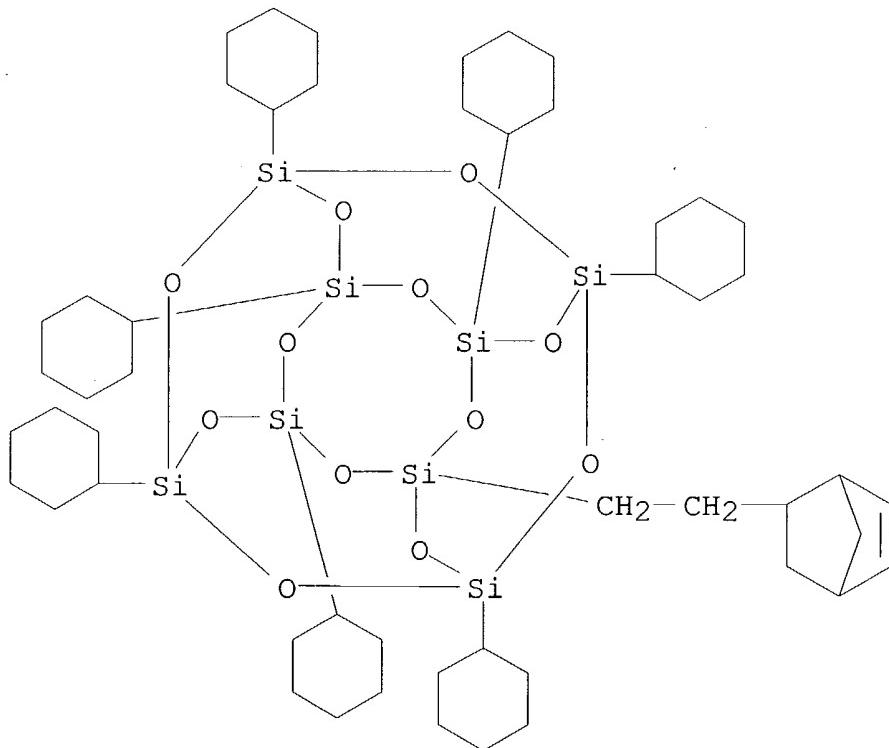
126:264639 Hybrid, norbornenyl-based polyhedral oligosilsesquioxane (POSS) polymers. Haddad, Timothy S.; Farris, Amy R.; Lichtenhan, Joseph D. (Phillips Lab., Hughes STX Corporation, Edwards Air Force Base, CA, 93524-7680, USA). Polymer Preprints (American Chemical Society, Division of Polymer Chemistry), 38(1), 127-128 (English) 1997. CODEN: ACPPAY. ISSN: 0032-3934. Publisher: American

- AB Chemical Society, Division of Polymer Chemistry.
- AB Silsesquioxanetriols were treated with norbornenylethyltrichlorosilane followed by metathesis ring-opening polymn. in the presence of various proportions of norbornene to give polymers contg. pendant polyhedral oligosilsesquioxane.
- IT **188859-54-3P 188859-55-4P**  
 (prepn. of hybrid norbornenyl-based polyhedral oligosilsesquioxane polymers)
- RN 188859-54-3 HCA
- CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, (2-bicyclo[2.2.1]hept-5-en-2-ylethyl)heptacyclohexyl-, polymer with bicyclo[2.2.1]hept-2-ene (9CI) (CA INDEX NAME)

CM 1

CRN 188859-52-1

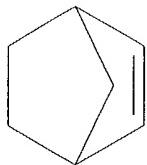
CMF C51 H90 O12 Si8



CM 2

CRN 498-66-8

CMF C7 H10



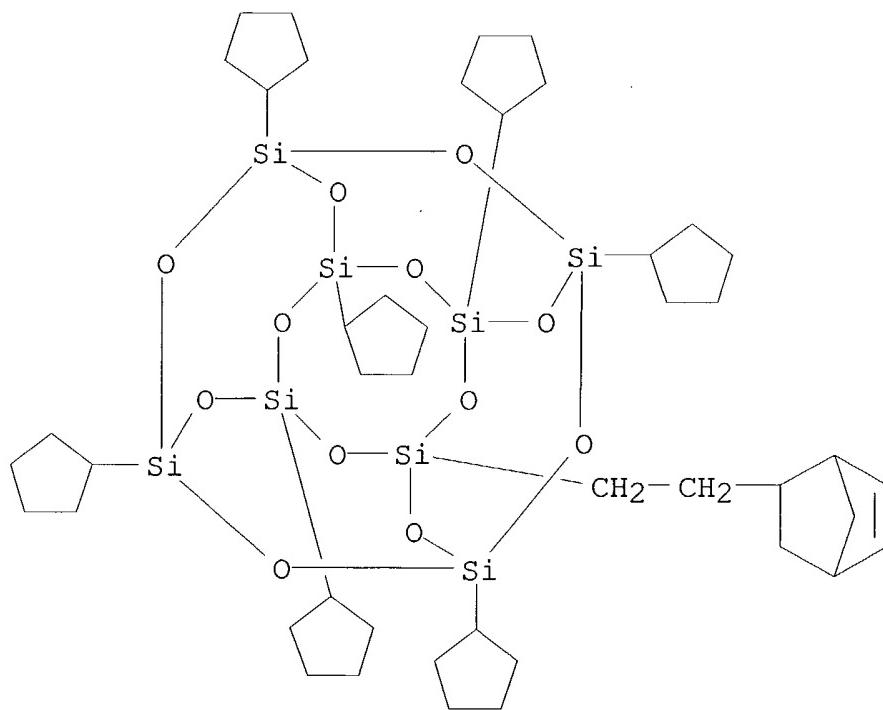
RN 188859-55-4 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, (2-bicyclo[2.2.1]hept-5-en-2-ylethyl)heptacyclopentyl-, polymer with bicyclo[2.2.1]hept-2-ene (9CI) (CA INDEX NAME)

CM 1

CRN 188859-53-2

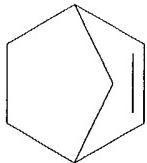
CMF C44 H76 O12 Si8



CM 2

CRN 498-66-8

CMF C7 H10



IT 188859-54-3P 188859-55-4P

(prepn. of hybrid norbornenyl-based polyhedral oligosilsesquioxane polymers)

=&gt; d 128 4,8,12,16,20,23 cbib abs hitstr hitrn

L28 ANSWER 4 OF 23 HCA COPYRIGHT 2004 ACS on STN

139:365783 Castable shape memory polymers. Mather, Patrick T.; Liu, Changdeng (University of Connecticut, USA). PCT Int. Appl. WO 2003093341 A1 20031113, 26 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2003-US13355 20030430. PRIORITY: US 2002-PV377544 20020502.

AB Shape memory polymers prep'd. by copolymg. two monomers, which each sep. produce polymers characterized by different glass transition temps. in the presence of a difunctional monomer whereby the copolymer formed is cross-linked during the polymn. to form a thermoset network. The transition temp. of the final polymers is adjusted by the ratio of the monomers selected, to 20-110°, while the degree of crosslinking controls the rubbery modulus plateau. The shape memory polymers can be processed as castable formulations in the form of coatings and films. The copolymers are optically transparent and are useful as medical plastics. The invention also relates to the articles of manuf. thereof and methods of the prepn. and use thereof.

IT 620179-62-6P

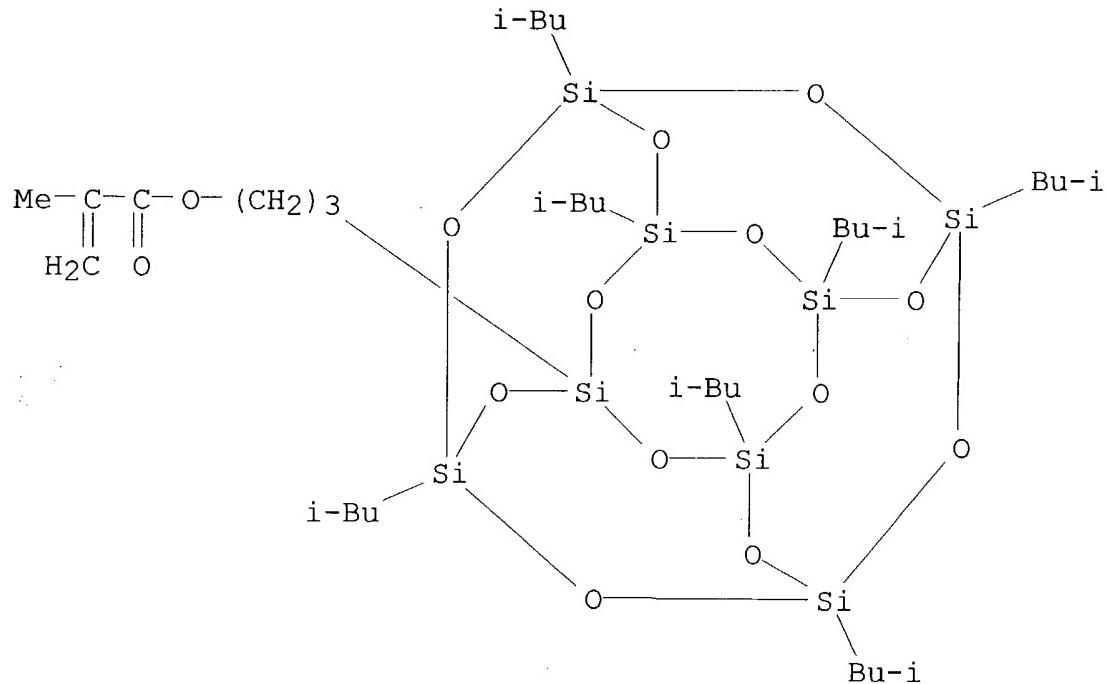
(castable shape memory polymers)

RN 620179-62-6 HCA

CN 2-Propenoic acid, 2-methyl-, oxybis(2,1-ethanediyl) ester, polymer with butyl 2-methyl-2-propenoate, 3-[heptakis(2-methylpropyl)pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl]propyl 2-methyl-2-propenoate and methyl 2-methyl-2-propenoate

(9CI) (CA INDEX NAME)

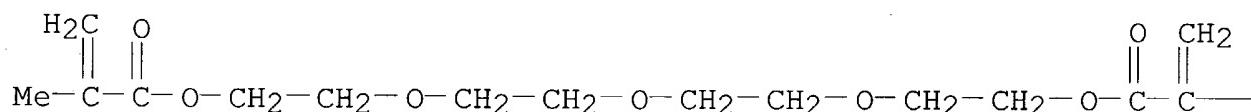
CM 1

CRN 307531-94-8  
CMF C35 H74 O14 Si8

CM 2

CRN 109-17-1  
CMF C16 H26 O7

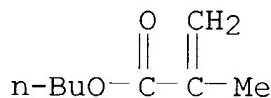
PAGE 1-A



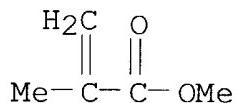
PAGE 1-B

— Me

CM 3

CRN 97-88-1  
CMF C8 H14 O2

CM 4

CRN 80-62-6  
CMF C5 H8 O2IT 620179-62-6P  
(castable shape memory polymers)

L28 ANSWER 8 OF 23 HCA COPYRIGHT 2004 ACS on STN  
 138:107082 Synthesis and properties of novel fluoroalkyl end-capped oligomers containing silsesquioxane segments. Sawada, Hideo; Yoshioka, Hiroaki; Ohashi, Ryusei; Kawase, Tokuzo (Department of Chemistry, Nara National College of Technology, Nara, 639-1080, Japan). Journal of Applied Polymer Science, 86(14), 3486-3493 (English) 2002. CODEN: JAPNAB. ISSN: 0021-8995. Publisher: John Wiley & Sons, Inc..

AB Fluoroalkyl end-capped homo- and cooligomers contg. silsesquioxane segments were prep'd. by the reactions of fluoroalkanoyl peroxides with the corresponding methacrylate monomer-bearing silsesquioxane unit (Si-MMA) and comonomers such as N,N-dimethylacrylamide (DMAA) and acrylic acid (ACA). These new fluorinated Si-MMA oligomers were easily sol. in various org. solvents and were able to reduce the surface tension of m-xylene effectively. The modified poly(Me

methacrylate) [PMMA] and glass surface treated with fluorinated Si-MMA homo-oligomers exhibited a strong oleophobicity, although these fluorinated oligomers possess high oleophilic silsesquioxane segments. In contrast, the modified PMMA surface treated with fluorinated Si-MMA-DMAA cooligomers exhibited a good hydrophilicity with a strong oleophobicity. In a series of fluorinated Si-MMA oligomers, fluorinated Si-MMA homo-oligomers had a relatively high thermal stability. Therefore, these fluoroalkyl end-capped Si-MMA oligomers are suggested to have high potential for new functional materials through their unique properties such as a high solv. and surface active properties.

IT 169699-57-4P 488760-37-8P 488760-38-9P

(synthesis and properties of novel fluoroalkyl end-capped oligomers contg. silsesquioxane segments)

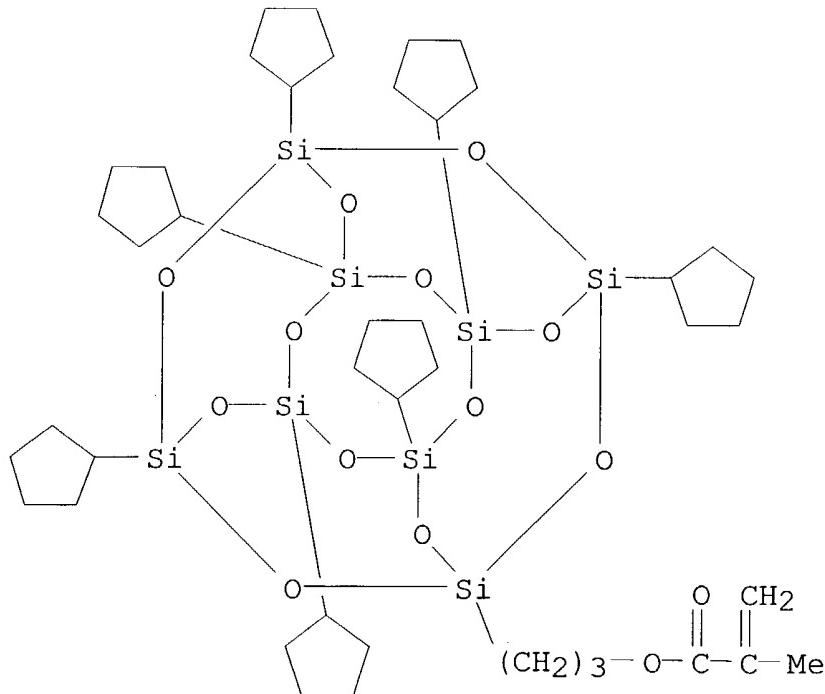
RN 169699-57-4 HCA

CN 2-Propenoic acid, 2-methyl-, 3-(heptacyclopentylpentacyclo[9.5.1.13, 9.15,15.17,13]octasiloxanyl)propyl ester, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 169391-91-7

CMF C42 H74 O14 Si8



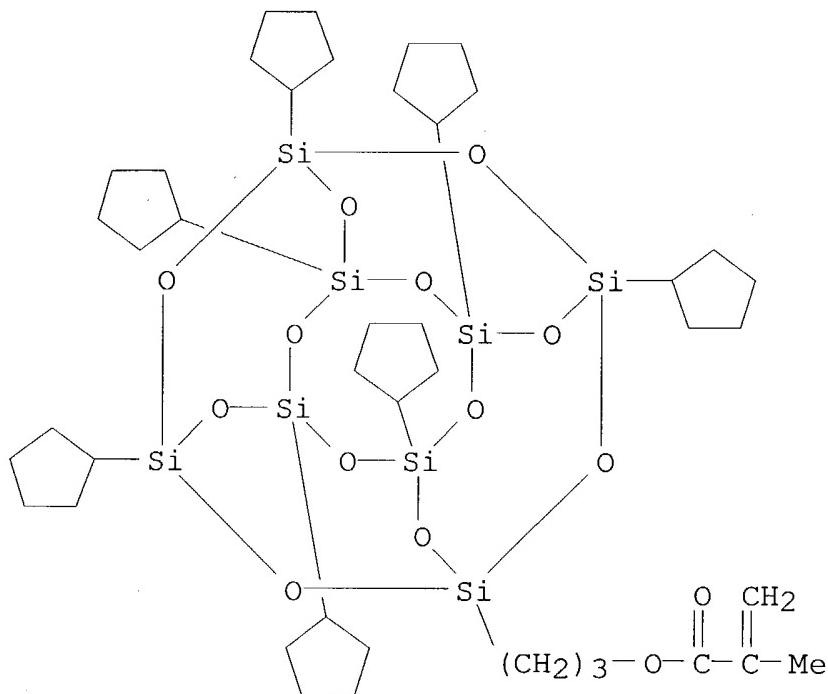
RN 488760-37-8 HCA

CN 2-Propenoic acid, 2-methyl-, 3-(heptacyclopentylpentacyclo[9.5.1.13, 9.15,15.17,13]octasiloxanyl)propyl ester, polymer with 2-propenoic acid (9CI) (CA INDEX NAME)

CM 1

CRN 169391-91-7

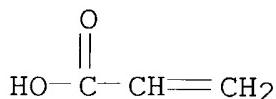
CMF C42 H74 O14 Si8



CM 2

CRN 79-10-7

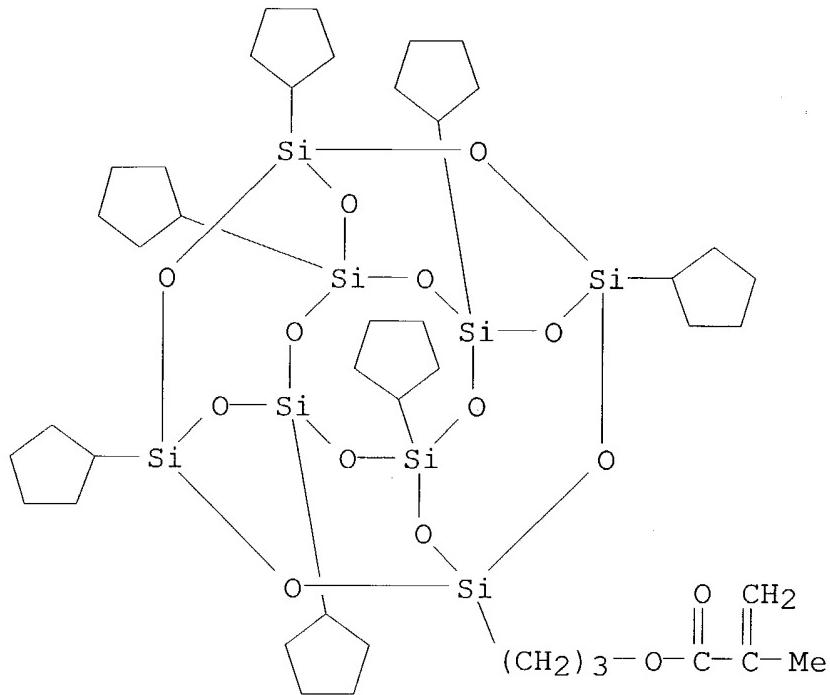
CMF C3 H4 O2



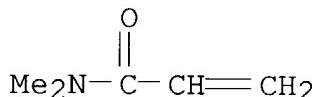
RN 488760-38-9 HCA

CN 2-Propenoic acid, 2-methyl-, 3-(heptacyclopentylpentacyclo[9.5.1.13, 9.15,15.17,13]octasiloxanyl)propyl ester, polymer with N,N-dimethyl-2-propenamide (9CI) (CA INDEX NAME)

CM 1

CRN 169391-91-7  
CMF C42 H74 O14 Si8

CM 2

CRN 2680-03-7  
CMF C5 H9 N O

IT 169699-57-4P 488760-37-8P 488760-38-9P

(synthesis and properties of novel fluoroalkyl end-capped oligomers contg. silsesquioxane segments)

L28 ANSWER 12 OF 23 HCA COPYRIGHT 2004 ACS on STN  
 137:20623 Copolymers of MMA and polyhedral oligosilsesquioxanes (POSS)  
 with thermal property enhancements. Xiao, Jun; Feher, Frank J.  
 (Dep. Chem., Univ. California, Irvine, CA, 92697-2025, USA).  
 Polymer Preprints (American Chemical Society, Division of Polymer

Chemistry), 43(1), 504-505 (English) 2002. CODEN: ACPPAY. ISSN: 0032-3934. Publisher: American Chemical Society, Division of Polymer Chemistry.

AB Copolymers of Me methacrylate and polyhedral oligosilsesquioxanes POSS were synthesized and the reactivity ratios of the two comonomers were calcd. POSS showed high reactivity when it copolymerd. with Me methacrylate. Thermal property measurements indicate that incorporation of POSS into PMMA can increase the glass transition temp. and thermal decompn. temp. dramatically. These thermal property enhancements were contributed to the rigid Ph groups of POSS and its inorg. core.

IT 433969-21-2P

(reactivity ratios of MMA and polyhedral oligosilsesquioxanes copolymer. and resulting polymer thermal properties)

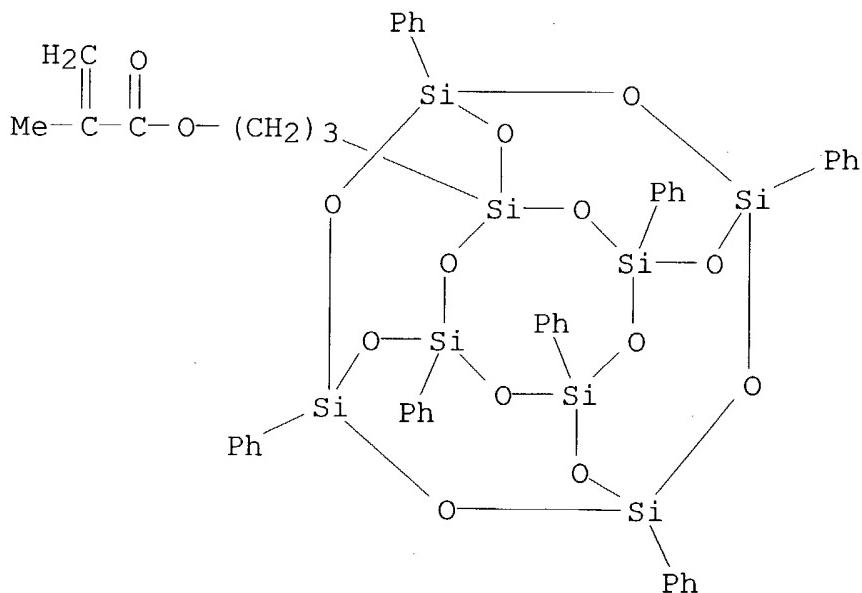
RN 433969-21-2 HCA

CN 2-Propenoic acid, 2-methyl-, 3-(heptaphenylpentacyclo[9.5.1.13,9.15,15.17,13]octasiloxanyl)propyl ester, polymer with methyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

CM 1

CRN 433969-20-1

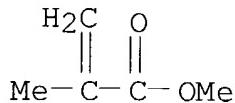
CMF C49 H46 O14 Si8



CM 2

CRN 80-62-6

CMF C5 H8 O2



IT 433969-21-2P

(reactivity ratios of MMA and polyhedral oligosilsesquioxanes copolymer. and resulting polymer thermal properties)

L28 ANSWER 16 OF 23 HCA COPYRIGHT 2004 ACS on STN

135:243298 Ionic conduction membrane for solid polymeric fuel cell and its manufacture. Arimura, Tomoaki (Nippon Jidosha Kenkyusho, Japan). Jpn. Kokai Tokkyo Koho JP 2001247741 A2 20010911, 11 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-63758 20000308.

AB Title ionic conduction membrane has methanol impermeability, heat resistance, high mech. strength, and low prodn. cost and is a composite film of a fiber material and a polymer resin comprising an arom. monomer, an ionically conductive monomer, a high-vol. monomer, and a crosslinking agent. The arom. monomer typically is an arom. vinyl monomer; the ionically conductive monomer is a vinyl monomer having an acid group; the high-vol. monomer is a cage-type monomer formed through bonds such as Si-O, Si-C, and C-C; the crosslinking agent contains arom. ring. The membrane is manufd. by impregnating the fiber material in the monomer soln. followed by polymn.

IT 360054-98-4P

(ionic conduction membrane for solid polymeric fuel cell and its manuf.)

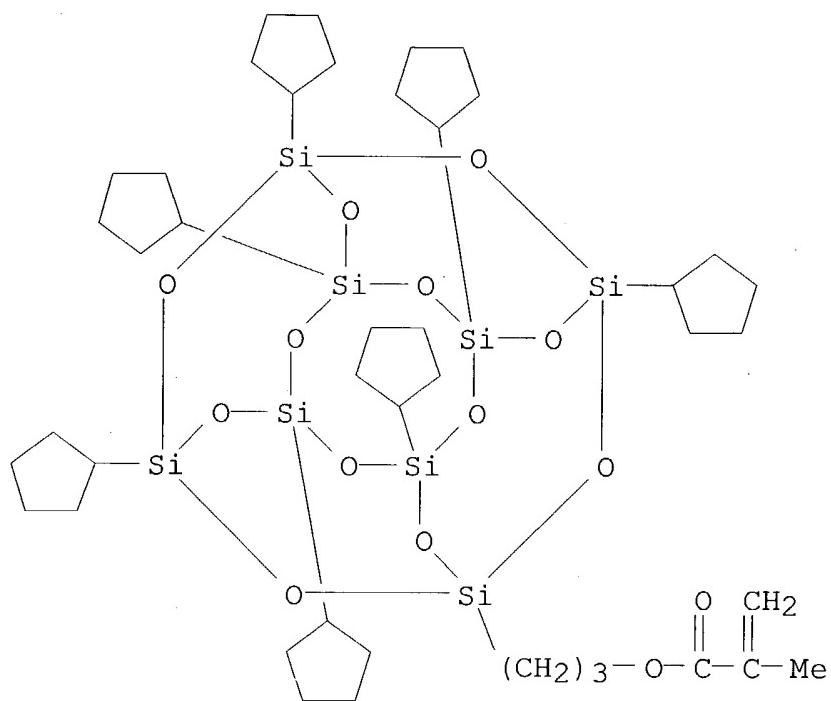
RN 360054-98-4 HCA

CN 2-Propenoic acid, 2-methyl-, 3-(heptacyclopentylpentacyclo[9.5.1.13, 9.15,15.17,13]octasiloxanyl)propyl ester, polymer with (1,1-dimethylethyl)ethenylbenzene, (1-methylethylidene)bis[4,1-phenyleneoxy(2-hydroxy-3,1-propanediyl)] di-2-propenoate and 2-methyl-2-[(1-oxo-2-propenyl)amino]-1-propanesulfonic acid (9CI) (CA INDEX NAME)

CM 1

CRN 169391-91-7

CMF C42 H74 O14 S18

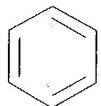


CM 2

CRN 25338-51-6

CMF C12 H16

CCI IDS

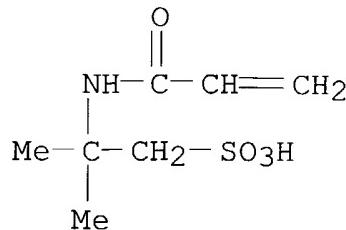
D1—CH=CH<sub>2</sub>

D1—Bu-t

CM 3

CRN 15214-89-8

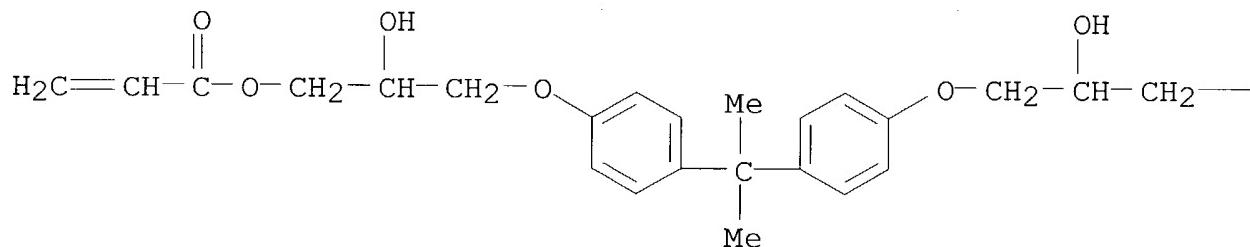
CMF C7 H13 N O4 S



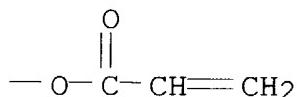
CM 4

CRN 4687-94-9  
CMF C27 H32 O8

PAGE 1-A



PAGE 1-B



IT 360054-98-4P

(ionic conduction membrane for solid polymeric fuel cell and its manuf.)

L28 ANSWER 20 OF 23 HCA COPYRIGHT 2004 ACS on STN

132:166622 Synthesis of organic/inorganic hybrid materials from polysiloxane precursors using atom transfer radical polymerization. Pyun, Jeffrey; Miller, Peter J.; Kickelbick, Guido; Matyjaszewski, Krzysztof; Schwab, Joseph; Lichtenhan, Joseph (Center for Macromolecular Engineering, Dept. of Chemistry, Carnegie Mellon University, Pittsburgh, PA, 15213, USA). Polymer Preprints

(American Chemical Society, Division of Polymer Chemistry), 40(2), 454-455 (English) 1999. CODEN: ACPPAY. ISSN: 0032-3934.

Publisher: American Chemical Society, Division of Polymer Chemistry.

**AB** The synthesis of org./inorg. hybrid materials from polyhedral oligomeric silsesquioxanes (POSS) using atom transfer radical polymn. (ATRP) was carried out. From POSS monomers contg. either methacryloyl, or styryl groups, well-defined polymers of various compns. and topologies were prep'd. The compn. of these materials was controlled and well-defined homopolymers, random and block copolymers of POSS-contg. monomers were synthesized. The use of macroinitiators of various topologies allowed for the synthesis of ABA-triblock and star-block copolymers, using ATRP.

**IT** **255872-36-7P**

(block; prepn. of methacryloyl- and styryl-silsesquioxane homopolymers and block copolymers and star copolymers by ATRP as precursors for org./inorg. hybrid materials)

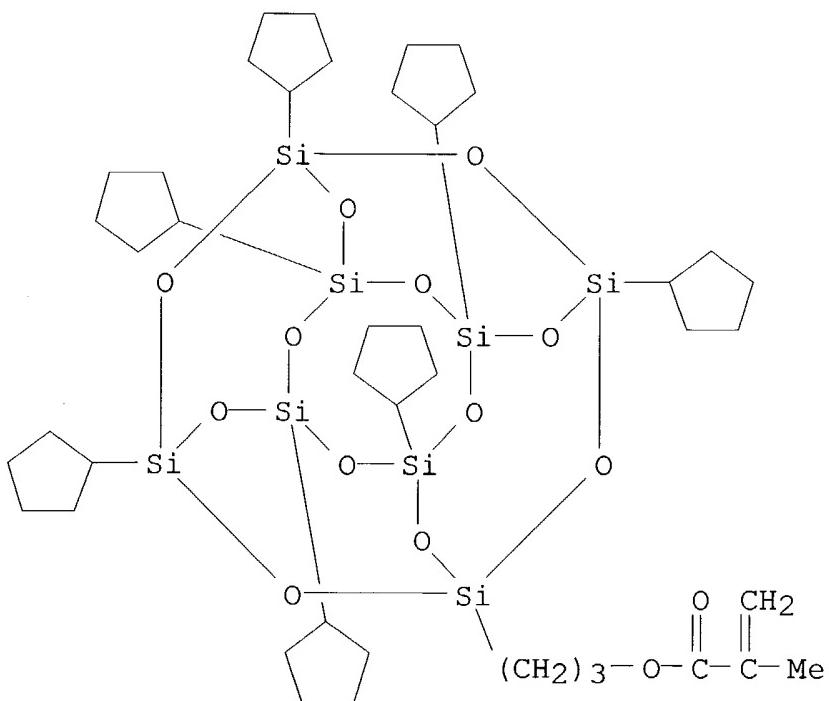
**RN** 255872-36-7 HCA

**CN** 2-Propenoic acid, 2-methyl-, 3-(heptacyclopentylpentacyclo[9.5.1.13, 9.15,15.17,13]octasiloxanyl)propyl ester, polymer with butyl 2-propenoate, block (9CI) (CA INDEX NAME)

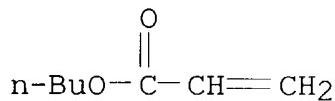
**CM** 1

**CRN** 169391-91-7

**CMF** C42 H74 O14 Si8



CM 2

CRN 141-32-2  
CMF C7 H12 O2

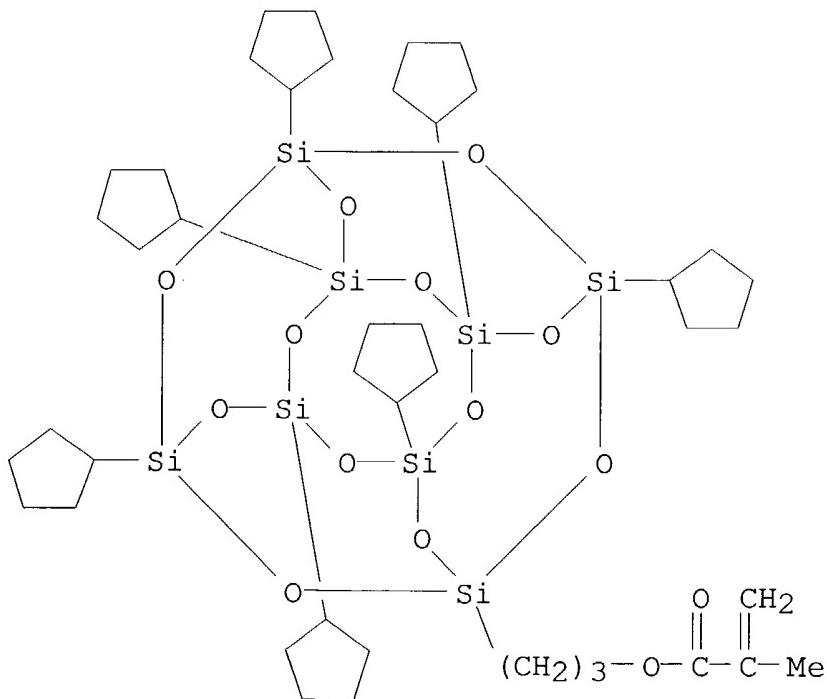
IT 169699-57-4P

(prepn. of methacryloyl- and styryl-silsesquioxane homopolymers and block copolymers and star copolymers by ATRP as precursors for org./inorg. hybrid materials)

RN 169699-57-4 HCA

CN 2-Propenoic acid, 2-methyl-, 3-(heptacyclopentylpentacyclo[9.5.1.13, 9.15,15.17,13]octasiloxanyl)propyl ester, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 169391-91-7  
CMF C42 H74 O14 Si8

IT 255872-37-8P

(star block; prepn. of methacryloyl- and styryl-silsesquioxane homopolymers and block copolymers and star copolymers by ATRP as precursors for org./inorg. hybrid materials)

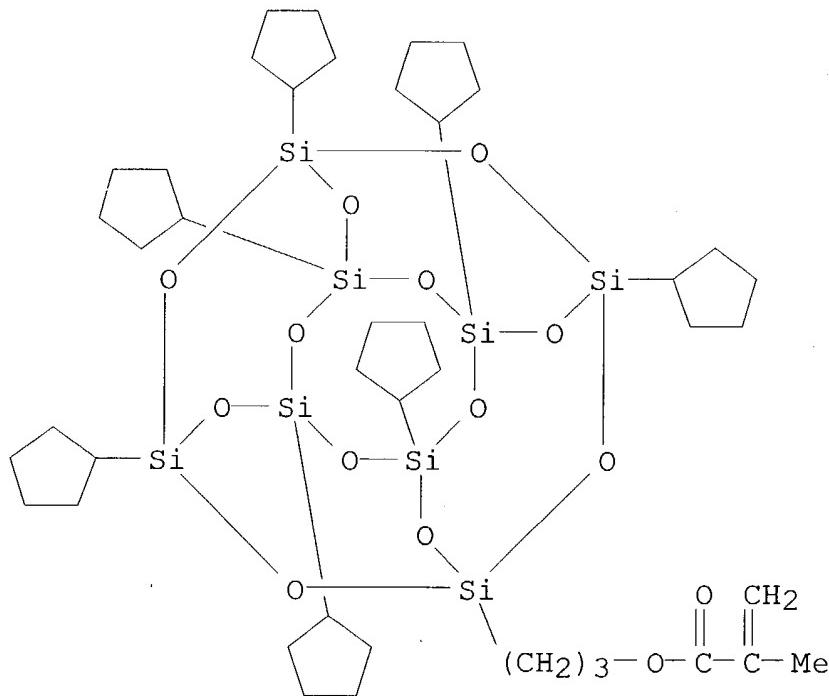
RN 255872-37-8 HCA

CN 2-Propenoic acid, 2-methyl-, 3-(heptacyclopentylpentacyclo[9.5.1.13, 9.15,15.17,13]octasiloxanyl)propyl ester, polymer with methyl 2-propenoate, block (9CI) (CA INDEX NAME)

CM 1

CRN 169391-91-7

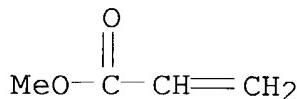
CMF C42 H74 O14 Si8



CM 2

CRN 96-33-3

CMF C4 H6 O2



- IT **255872-36-7P**  
(block; prepn. of methacryloyl- and styryl-silsesquioxane homopolymers and block copolymers and star copolymers by ATRP as precursors for org./inorg. hybrid materials)
- IT **169699-57-4P**  
(prepn. of methacryloyl- and styryl-silsesquioxane homopolymers and block copolymers and star copolymers by ATRP as precursors for org./inorg. hybrid materials)
- IT **255872-37-8P**  
(star block; prepn. of methacryloyl- and styryl-silsesquioxane homopolymers and block copolymers and star copolymers by ATRP as precursors for org./inorg. hybrid materials)

L28 ANSWER 23 OF 23 HCA COPYRIGHT 2004 ACS on STN  
123:286789 Coupling of allyloxy and propargyloxy moieties with hydridosilanes: novel liquid crystalline functionalized silsesquioxanes. Sellinger, Alan; Laine, Richard M. (Department Materials Science Engineering, University Michigan, Ann Arbor, MI, 48109-2136, USA). Polymer Preprints (American Chemical Society, Division of Polymer Chemistry), 35(2), 665-6 (English) 1994. CODEN: ACPPAY. ISSN: 0032-3934. Publisher: American Chemical Society, Division of Polymer Chemistry.

AB The synthesis and characterization of novel liq. cryst. and methacrylate-functionalized silsesquioxanes (HSiO<sub>1.5</sub>)<sub>8</sub> prep'd. by Pt-catalyzed coupling of 4 equiv. of 4-(4-allyloxybenzoyloxy)biphenyl or propargyl methacrylate with 1 equiv. octahydridosilsesquioxane. The low polymn. temp. for the methacrylate-functionalized silsesquioxane shows very promising utility for use in dental materials and abrasion-resistant coatings.

IT **169893-90-7P**  
(prepn. and polymn. of liq. cryst. functionalized silsesquioxanes)

RN 169893-90-7 HCA

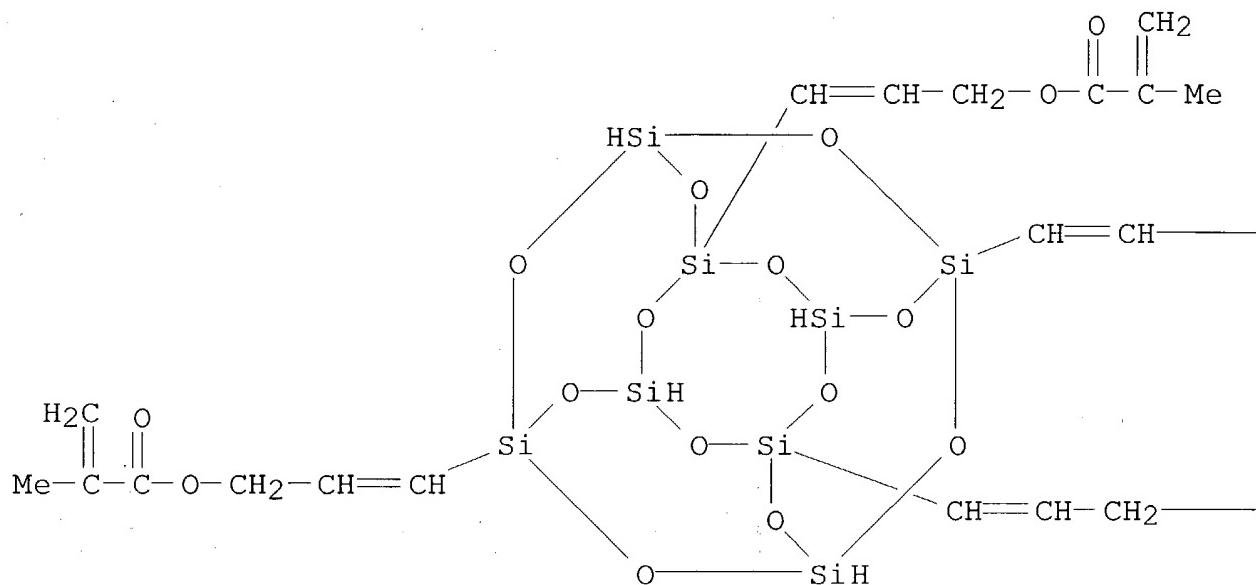
CN 2-Propenoic acid, 2-methyl-, pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane-1,5,9,13-tetrayltetra-2-propene-3,1-diyl ester, homopolymer (9CI) (CA INDEX NAME)

CM 1

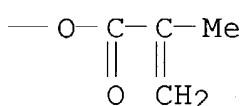
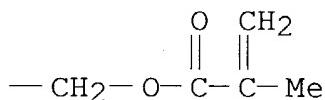
CRN 169893-88-3

CMF C28 H40 O20 Si8

PAGE 1-A



PAGE 1-B



IT 169893-90-7P

(prepn. and polymn. of liq. cryst. functionalized

silsesquioxanes)

=> d 129 5,10,15,20,25,30 cbib abs hitstr hitrn

L29 ANSWER 5 OF 30 HCA COPYRIGHT 2004 ACS on STN

138:74288 Polymer electrolytes and polyethylene glycol-containing crosslinked polysiloxanes therefor. Iwatani, Keizo; Yoza, Akira; Oikawa, Takao; Yamamoto, Yasuhiro (Chisso Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2003002974 A2 20030108, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2001-188321 20010621.

AB The electrolytes, showing good flexibility and high ion cond., comprise Li salts and crosslinked polysiloxanes having trifunctional Si and polyoxyethylene repeating units,. The polysiloxanes may be represented by  $[X(OX_2H_4)q_1OY_1]_nZm[(R_2SiO)rSiO_3/2]_p$  [X = C1-6 alkyl; Y1 = C2-20 alkylene; Z = group both-ends-terminated with C2-20 alkylene; R = X1-6 alkyl; q1, n, m ≥ 1; r = 0, 1; p = 4-60; n + 2m = p]. Thus, triethylene glycol allyl Me ether 0.803, polyethylene glycol diallyl ether 0.748, and 1,3,5,7,9,11,13,15-octakis(dimethylsiloxy)pentacyclo[9.5.1.13,9.15,15.1.7,13]octasiloxane 1.00 g were reacted at 80-120° in the presence of Pt-divinyltetramethyldisiloxane complex to give a crosslinked product, 0.1 g of which was reacted with 5.98 + 10-3 g LiClO<sub>4</sub> in THF to give a solid electrolyte showing ion cond. 1.8 + 10-5 S/cm and flexural modulus 0.53 MPa at room. temp.

IT 481052-04-4DP, reaction products with triethylene glycol allyl Me ether, lithium complexes, hydrochlorate-contg. (high-ion-cond. and flexible solid electrolytes of polyethylene glycol-contg. POSS-Li complexes)

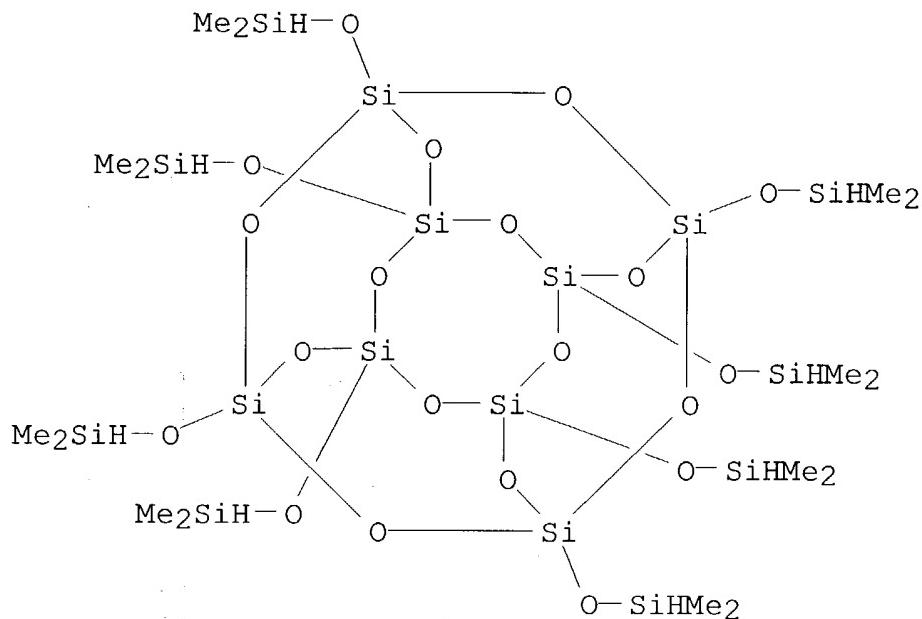
RN 481052-04-4 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, octakis[(dimethylsilyl)oxy]-, polymer with α-2-propenyl-ω-(2-propenyloxy)poly(oxy-1,2-ethanediyl) (9CI) (CA INDEX NAME)

CM 1

CRN 125756-69-6

CMF C16 H56 O20 Si16

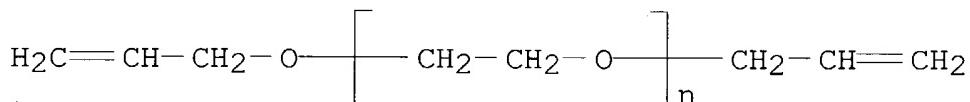


CM 2

CRN 59788-01-1

CMF (C<sub>2</sub> H<sub>4</sub> O)<sub>n</sub> C<sub>6</sub> H<sub>10</sub> O

CCI PMS



IT **481052-04-4DP**, reaction products with triethylene glycol allyl Me ether, lithium complexes, hydrochlorate-contg.  
(high-ion-cond. and flexible solid electrolytes of polyethylene glycol-contg. POSS-Li complexes)

L29 ANSWER 10 OF 30 HCA COPYRIGHT 2004 ACS on STN

134:29756 Chemistry of Hydrogen-Octasilsesquioxane: Preparation and Characterization of Octasilsesquioxane-Containing Polymers. Auner, Norbert; Bats, Jan W.; Katsoulis, Dimitris E.; Suto, Michitaka; Tecklenburg, Ronald E.; Zank, Gregg A. (Inst. fur Anorg. Chemie, Johann Wolfgang Goethe University, Frankfurt/Main, D-60439, Germany). Chemistry of Materials, 12(11), 3402-3418 (English) 2000. CODEN: CMATEX. ISSN: 0897-4756. Publisher: American Chemical Society.

AB Over the past five years, there have been a no. of studies that have

concerned themselves with controlling the structure of inorg. networks. Many of these studies have been undertaken due to the need for more advanced or structurally ordered materials in a variety of elec. and optical applications. One of the approaches to create materials that are structurally ordered has been to assemble the higher mol. wt. polymers and materials not from monomeric precursors but from partially assembled oligomeric structural building blocks. In the silicone materials area, the well-known completely condensed cages Tn or Qnn- offer convenient higher order building blocks for larger structural assemblies. In most cases materials made by employing these cages as the building blocks have afforded gels or insol. network materials due to the high degree of functionality (typically n) present in these building blocks. In this paper, we report the prepn. of sol. resins that are HT8 cages linked together with divinyl species as links made by hydrosilation chem. and their characterization as it relates to previously reported studies. We have employed a range of linking groups (L) from orgs. (divinyl benzene) and  $\alpha$ - $\Omega$  functional siloxanes (from a d.p., DP, of 2-12). Interestingly, we have also found it possible to make sol. network materials even when employing two linking groups (L) per cage. We have combined the characterization of the high-mol.-wt. polymers with detailed characterization of small mols. made by these same hydrosilation reactions to provide insights into some relatively simple model Si-resin systems. The characterization of these relatively simple systems helps provide insights into the structure  $\leftrightarrow$  property relationships of silicone materials in general.

IT 271248-96-5P 294881-67-7P 294881-69-9P

310472-30-1P

(oligomers; prepn. and characterization of octasilsesquioxane-contg. polymers)

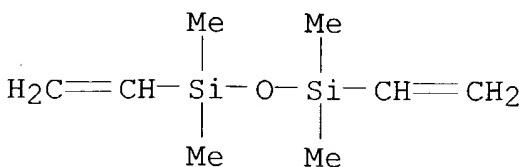
RN 271248-96-5 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, polymer with 1,3-diethenyl-1,1,3,3-tetramethyldisiloxane (9CI) (CA INDEX NAME)

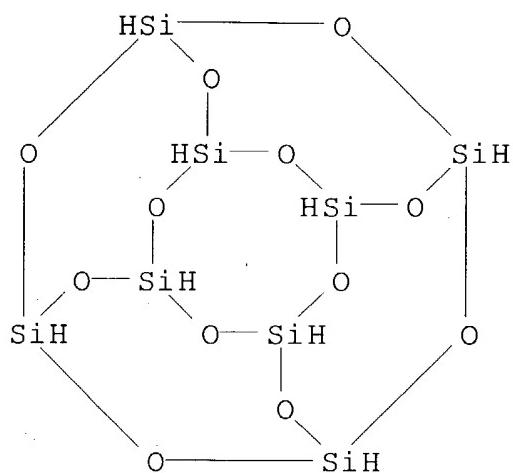
CM 1

CRN 2627-95-4

CMF C8 H18 O Si2



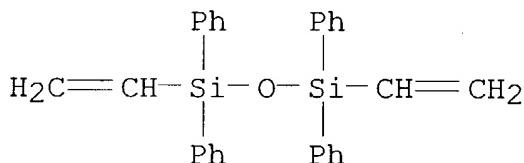
CM 2

CRN 281-50-5  
CMF H8 O12 Si8

RN 294881-67-7 HCA

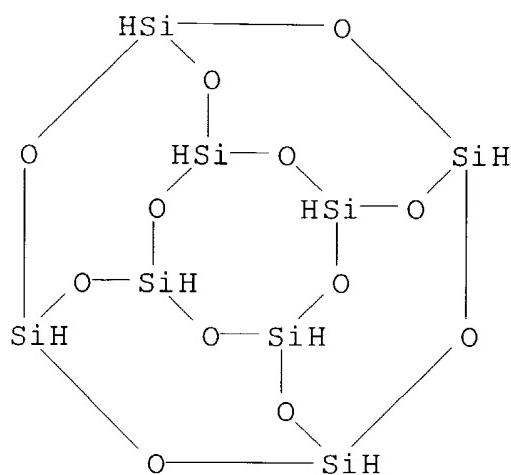
CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, polymer with  
1,3-diethenyl-1,1,3,3-tetraphenyldisiloxane (9CI) (CA INDEX NAME)

CM 1

CRN 18769-05-6  
CMF C28 H26 O Si2

CM 2

CRN 281-50-5  
CMF H8 O12 Si8



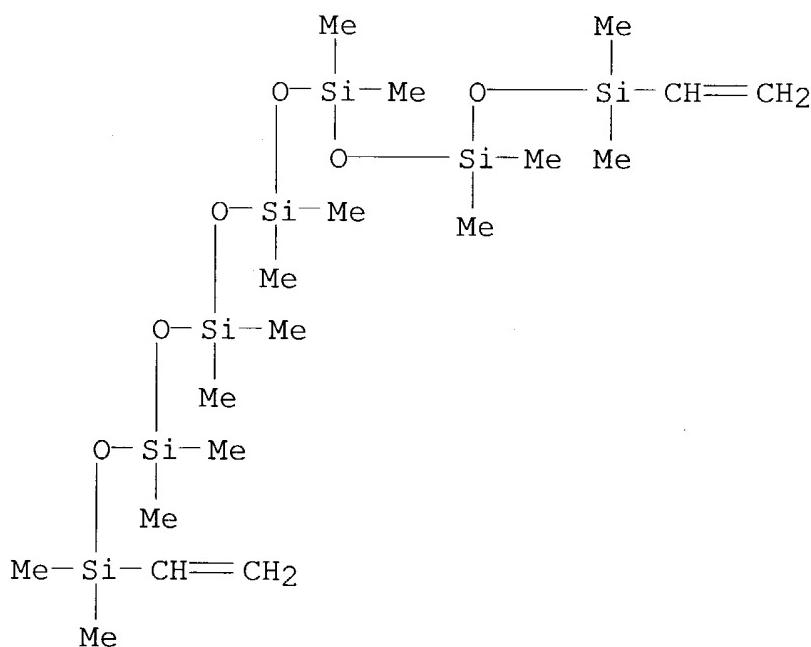
RN 294881-69-9 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, polymer with  
1,13-diethenyl-1,1,3,3,5,5,7,7,9,9,11,11,13,13-  
tetradecamethylheptasiloxane (9CI) (CA INDEX NAME)

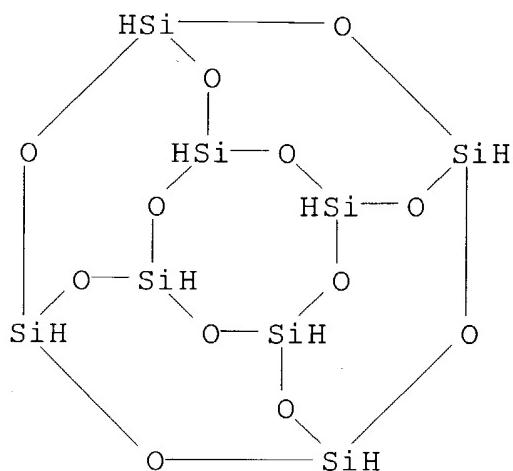
CM 1

CRN 87564-15-6

CMF C18 H48 O6 Si7

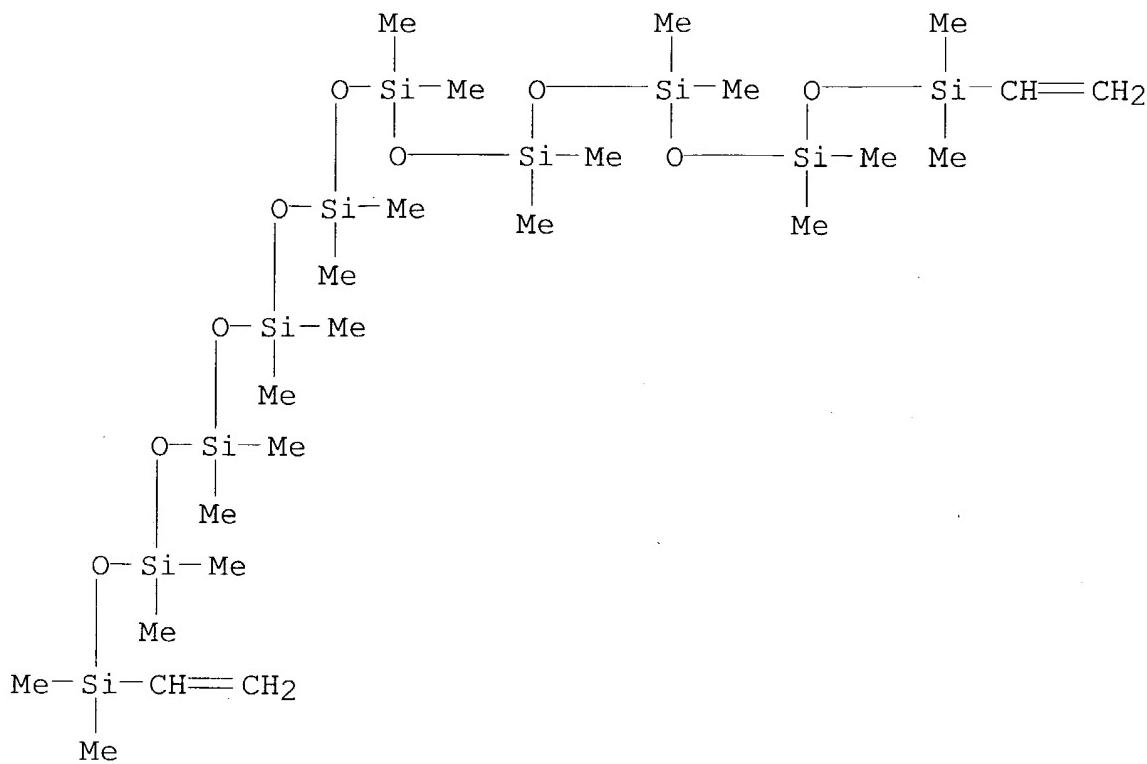


CM 2

CRN 281-50-5  
CMF H8 O12 Si8RN 310472-30-1 HCA  
CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, polymer with  
1,19-diethenyl-1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15,17,17,19,19-  
eicosamethyldecasiloxane (9CI) (CA INDEX NAME)

CM 1

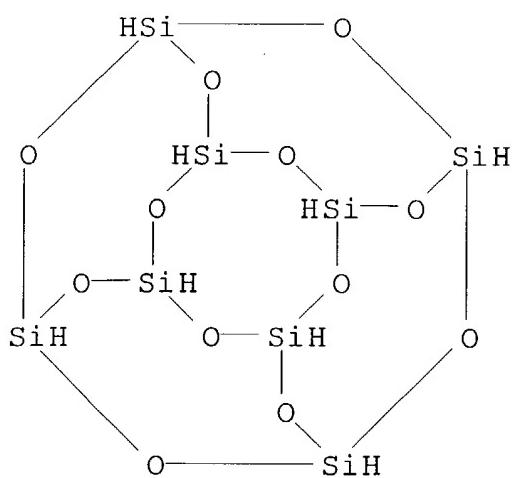
CRN 171729-39-8  
CMF C24 H66 O9 Si10



CM 2

CRN 281-50-5

CMF H8 O12 Si8



IT 271248-96-5P 294881-67-7P 294881-69-9P  
310472-30-1P

(oligomers; prepn. and characterization of octasilsesquioxane-contg. polymers)

L29 ANSWER 15 OF 30 HCA COPYRIGHT 2004 ACS on STN  
132:195863 Thin coatings derived from cubic octasilicate monomers. Li, Chenghong; Wilkes, Garth L. (Polymer Materials and Interfaces Laboratory Department of Chemistry, Virginia Polytechnic Institute and State University, Blacksburg, VA, 24061, USA). Polymer Preprints (American Chemical Society, Division of Polymer Chemistry), 40(2), 778-779 (English) 1999. CODEN: ACPPAY. ISSN: 0032-3934. Publisher: American Chemical Society, Division of Polymer Chemistry.

AB Thin coatings on aluminum substrates were derived from dimethylsilyl or vinyldimethylsilyl cubic octasilicates by reacting with other silanes via hydrosilylation or by capping them with triethoxysilyl groups, followed by sol-gel reactions. The coating prepd. by hydrosilylation showed an onset of thermal decomprn. at 300° and had a wt. loss of 5% in air at 370° at a temp. ramp of 10°/min. The coating developed by sol-gel reactions with a hydrochloric acid catalyst had a higher extent of condensation than the coating developed with an acetic acid catalyst, however, the former catalyst also caused obvious cage-opening of the silicate cubes. All these coatings were transparent, but lacked abrasion resistance.

IT 259740-80-2P  
(prepn. of thin coatings derived from cubic octasilicate monomers)

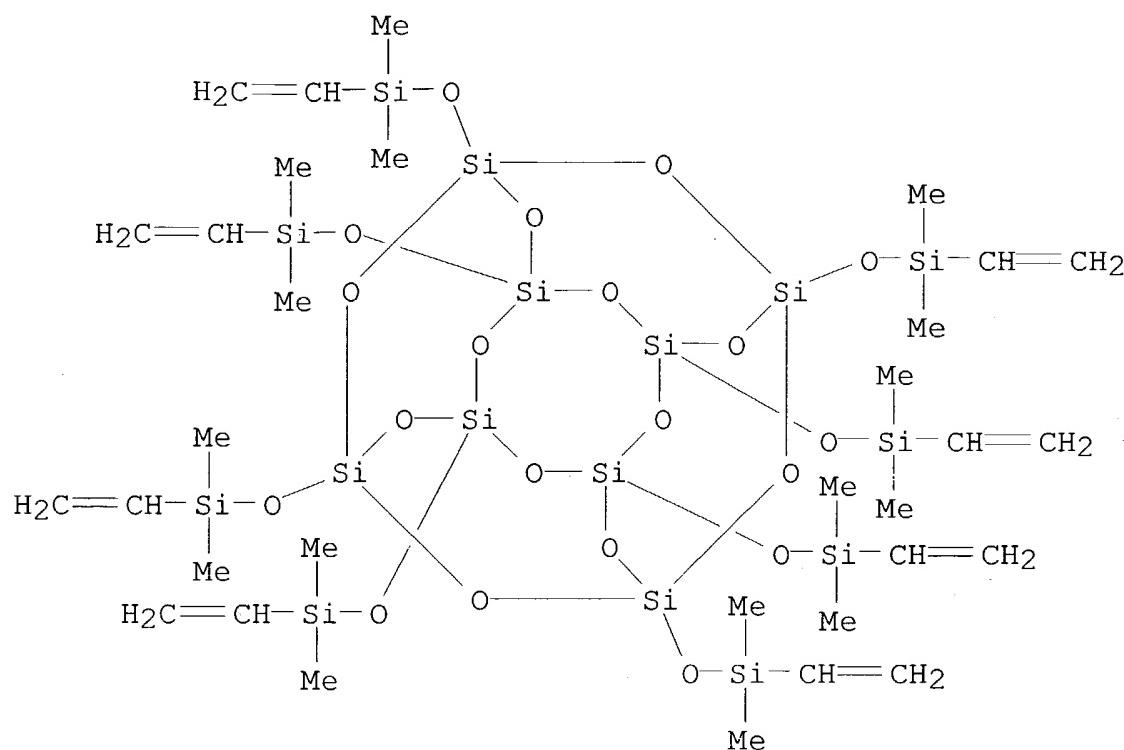
RN 259740-80-2 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, octakis[(ethenyldimethylsilyl)oxy]-, polymer with 3,3-bis[(dimethylsilyl)oxy]-1,1,5,5-tetramethyltrisiloxane and 1,3-diethenyl-1,1,3,3-tetramethyldisiloxane (9CI) (CA INDEX NAME)

CM 1

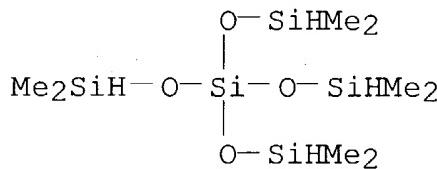
CRN 126503-69-3

CMF C32 H72 O20 Si16



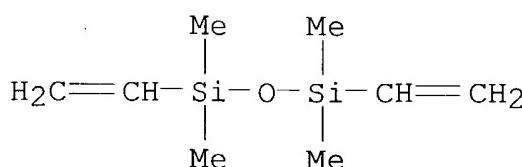
CM 2

CRN 17082-47-2  
 CMF C<sub>8</sub> H<sub>28</sub> O<sub>4</sub> Si<sub>5</sub>



CM 3

CRN 2627-95-4  
 CMF C<sub>8</sub> H<sub>18</sub> O Si<sub>2</sub>



IT 259740-80-2P

(prepn. of thin coatings derived from cubic octasilicate monomers)

L29 ANSWER 20 OF 30 HCA COPYRIGHT 2004 ACS on STN

129:217206 Highly Porous Polyhedral Silsesquioxane Polymers. Synthesis and Characterization. Zhang, Chunxin; Babonneau, Florence; Bonhomme, Christian; Laine, Richard M.; Soles, Christopher L.; Hristov, Hristo A.; Yee, Albert F. (Departments of Chemistry Materials Science and Engineering and the Macromolecular Science and Engineering Center, University of Michigan, Ann Arbor, MI, 48109, USA). Journal of the American Chemical Society, 120(33), 8380-8391 (English) 1998. CODEN: JACSAT. ISSN: 0002-7863. Publisher: American Chemical Society.

AB Polyhedral octahydridosilsesquioxanes,  $[\text{HSiO}1.5]_8$  (1) and  $[(\text{HSiMe}_2\text{O})\text{SiO}1.5]_8$  (3) were hydrosilylatively copolymd. with stoichiometric amts. of the octavinylsilsesquioxanes,  $[\text{vinylSiO}1.5]_8$  (2) and  $[(\text{vinylSiMe}_2\text{O})\text{SiO}1.5]_8$  (4) in toluene using platinum divinyltetramethyldisiloxane, "Pt(dvs)", as catalyst. The degree of condensation of the resultant four copolymers ranges from 43% to 81% depending on intercube chain lengths, as detd. by solid state  $^{13}\text{C}$  and  $^{29}\text{Si}$  MAS NMR analyses, using cross-polarization (CP) techniques. The presence of residual functional groups was confirmed by diffuse reflectance IR Fourier transform spectroscopy (DRIFTS). Polymer porosities were measured using nitrogen sorption, positron annihilation lifetime spectroscopy (PALS), and small angle X-ray scattering (SAXS) methods. The combination of these three techniques allows a relatively complete description of the pore sizes and pore size distributions in these materials. The pores in the cube interiors are .apprx.0.3 nm in diam., while those between the cubes range from 1 to 50 nm in diam. (for polymer 3 + 4). Nitrogen sorption analyses give sp. surface areas (SSAs) of 380 to 530 m<sup>2</sup>/g with "observable" pore vols. of 0.19-0.25 mL/g.

IT 161741-90-8P 173775-21-8P,

Octahydridoctasilsesquioxane-octavinylotcasilsesquioxane copolymer 173775-22-9P

(prepn. and characterization of highly porous polyhedral silsesquioxane polymers)

RN 161741-90-8 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, octakis[(dimethyl-2-

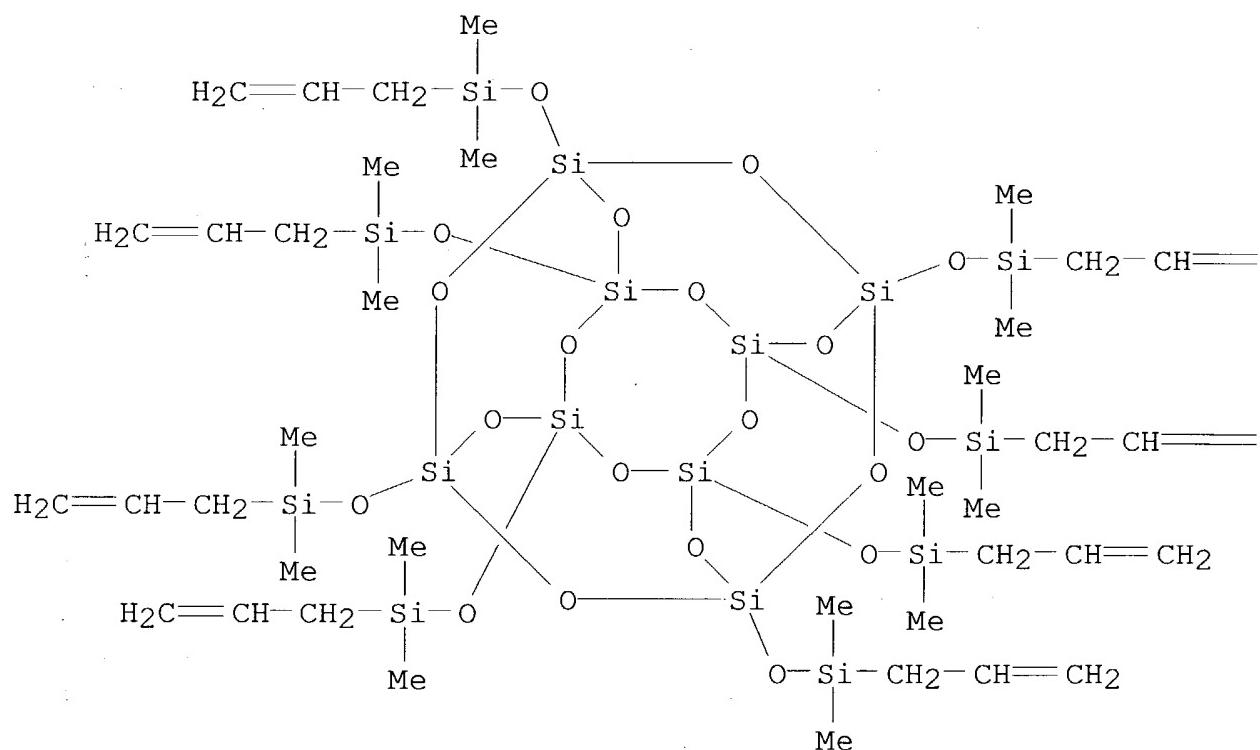
propenylsilyl)oxy]-, polymer with octakis[(dimethylsilyl)oxy]pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane (9CI) (CA INDEX NAME)

CM 1

CRN 127073-41-0

CMF C40 H88 O20 Si16

PAGE 1-A

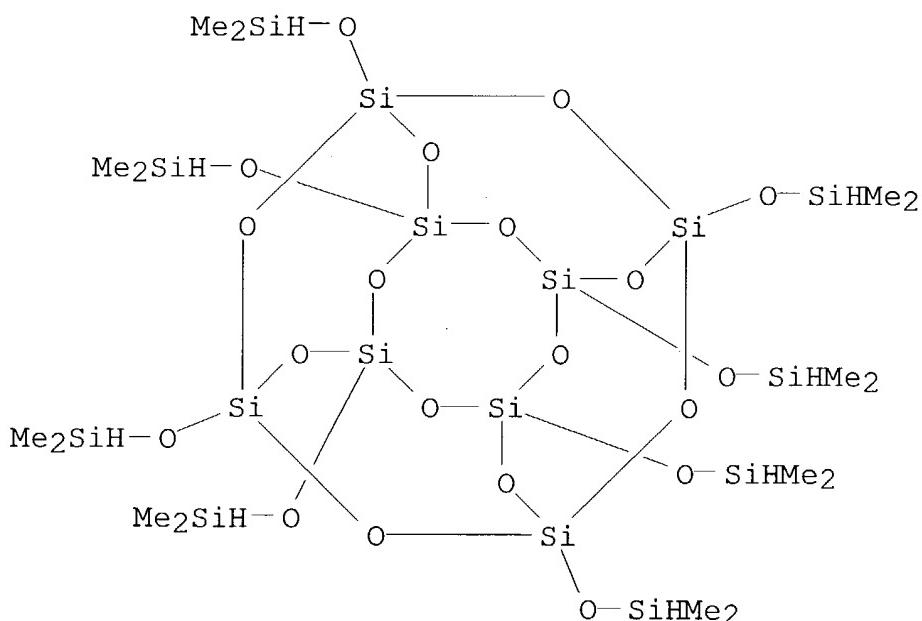


PAGE 1-B

 $\equiv \text{CH}_2$  $= \text{CH}_2$ 

CM 2

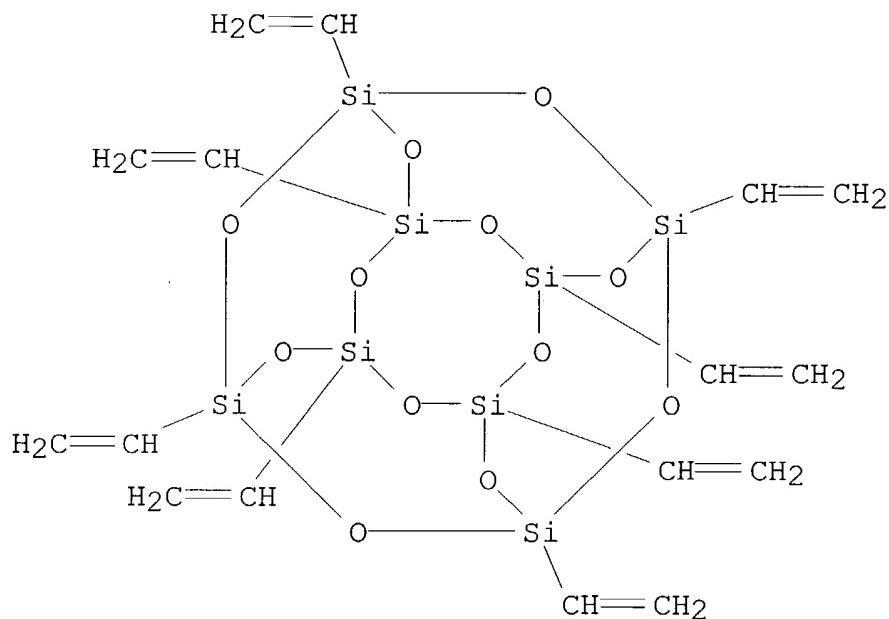
CRN 125756-69-6  
 CMF C16 H56 O20 Si16



RN 173775-21-8 HCA  
 CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, octaethenyl-,  
 polymer with pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane (9CI)  
 (CA INDEX NAME)

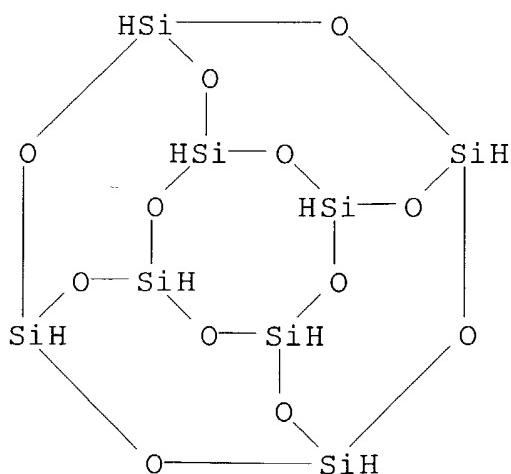
CM 1

CRN 69655-76-1  
 CMF C16 H24 O12 Si8



CM 2

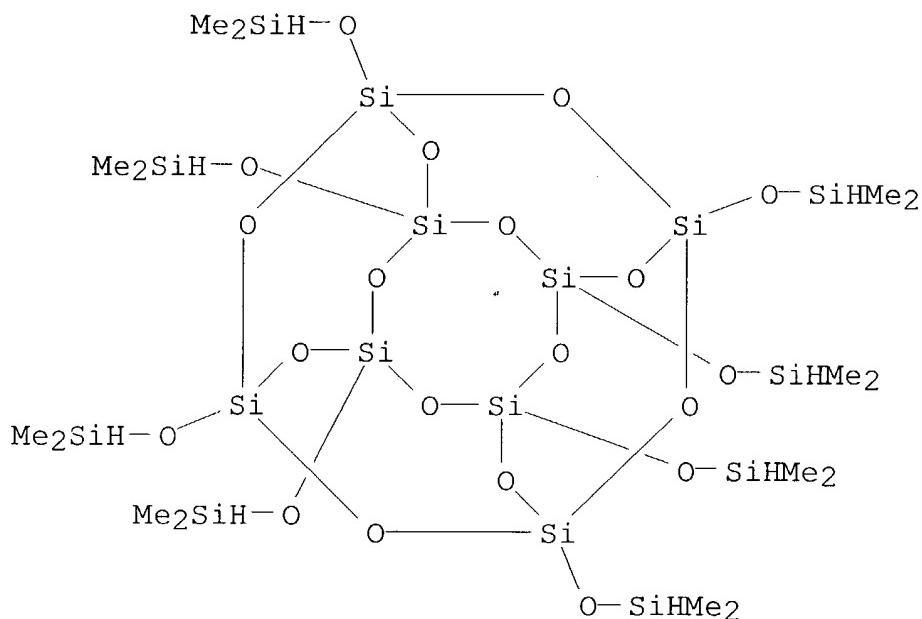
CRN 281-50-5  
 CMF H8 O12 Si8



RN 173775-22-9 HCA  
 CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, octaethenyl-,  
 polymer with octakis[(dimethylsilyl)oxy]pentacyclo[9.5.1.13,9.15,15.  
 17,13]octasiloxane (9CI) (CA INDEX NAME)

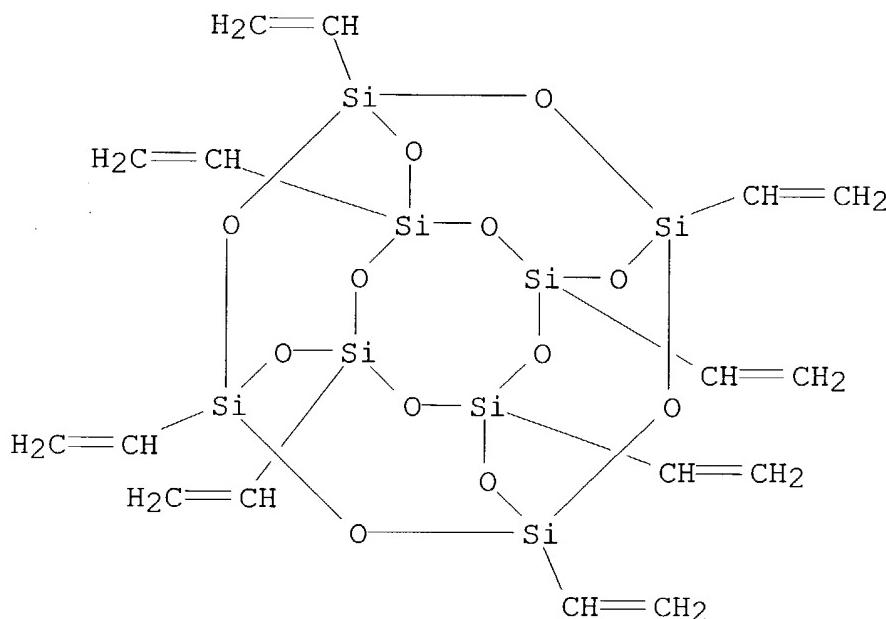
CM 1

CRN 125756-69-6  
 CMF C16 H56 O20 Si16



CM 2

CRN 69655-76-1  
 CMF C16 H24 O12 Si8



IT 161741-90-8P 173775-21-8P,  
 Octahydridoctasilsesquioxane-octavinylotatasilsesquioxane copolymer  
**173775-22-9P**  
 (prepn. and characterization of highly porous polyhedral  
 silsesquioxane polymers)

L29 ANSWER 25 OF 30 HCA COPYRIGHT 2004 ACS on STN  
 124:147466 Molecular composites from hydrido and vinyl functionalized silsesquioxanes. Zhang, Chunxin; Baranwal, Rita; Laine, Richard M. (Department of Chemistry, University of Michigan, Ann Arbor, MI, 48109, USA). Polymer Preprints (American Chemical Society, Division of Polymer Chemistry), 36(2), 342-3 (English) 1995. CODEN: ACPPAY. ISSN: 0032-3934. Publisher: American Chemical Society, Division of Polymer Chemistry.

AB The cross-coupling of hydrido and vinyl silsesquioxanes via Pt-catalyzed hydrosilylation was conducted to give polymeric materials. The polymers obtained were characterized.

IT 142468-08-4P 161741-91-9P 173775-21-8P  
**173775-22-9P**

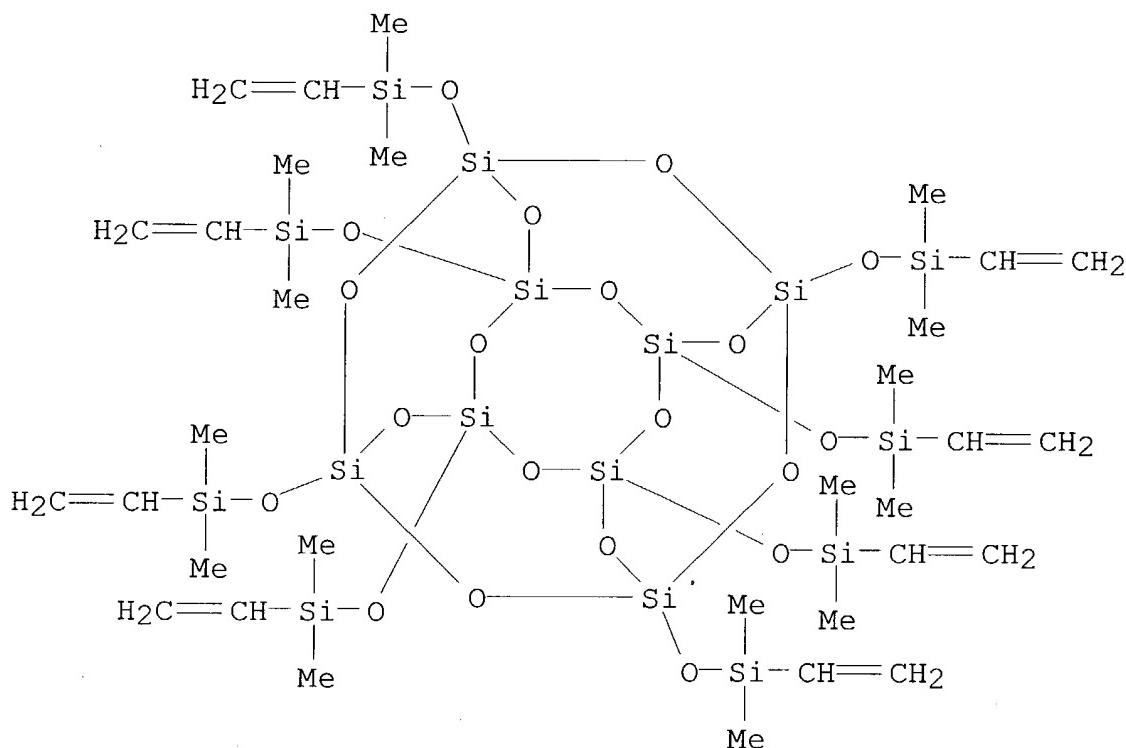
(prepn. and TGA and DSC characterization of mol. composites from hydrido and vinyl functionalized silsesquioxanes)

RN 142468-08-4 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane,  
 octakis[(dimethylsilyl)oxy]-, polymer with  
 octakis[(ethenyldimethylsilyl)oxy]pentacyclo[9.5.1.13,9.15,15.17,13]  
 octasiloxane (9CI) (CA INDEX NAME)

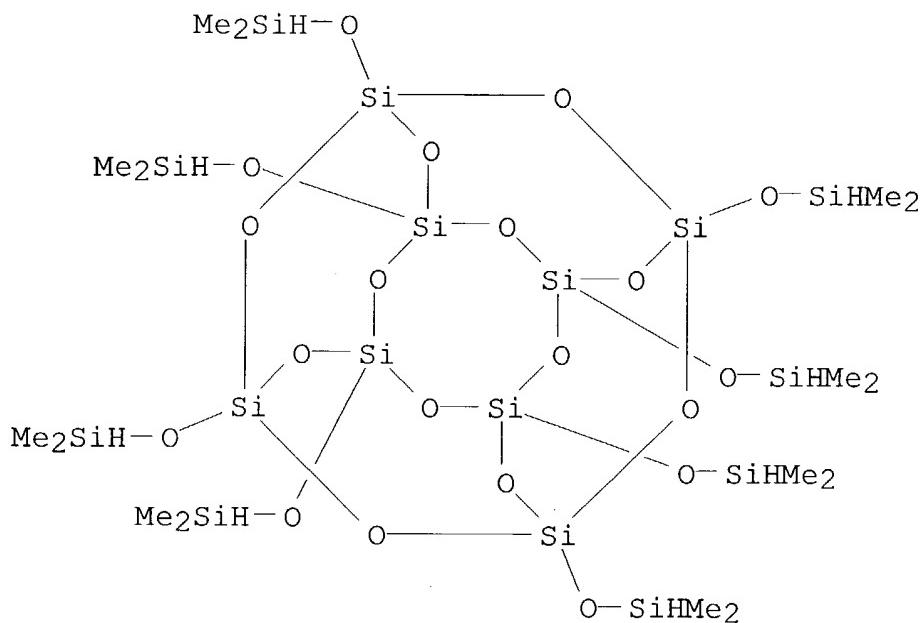
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CM 2

CRN 125756-69-6  
 CMF C16 H56 O20 Si16



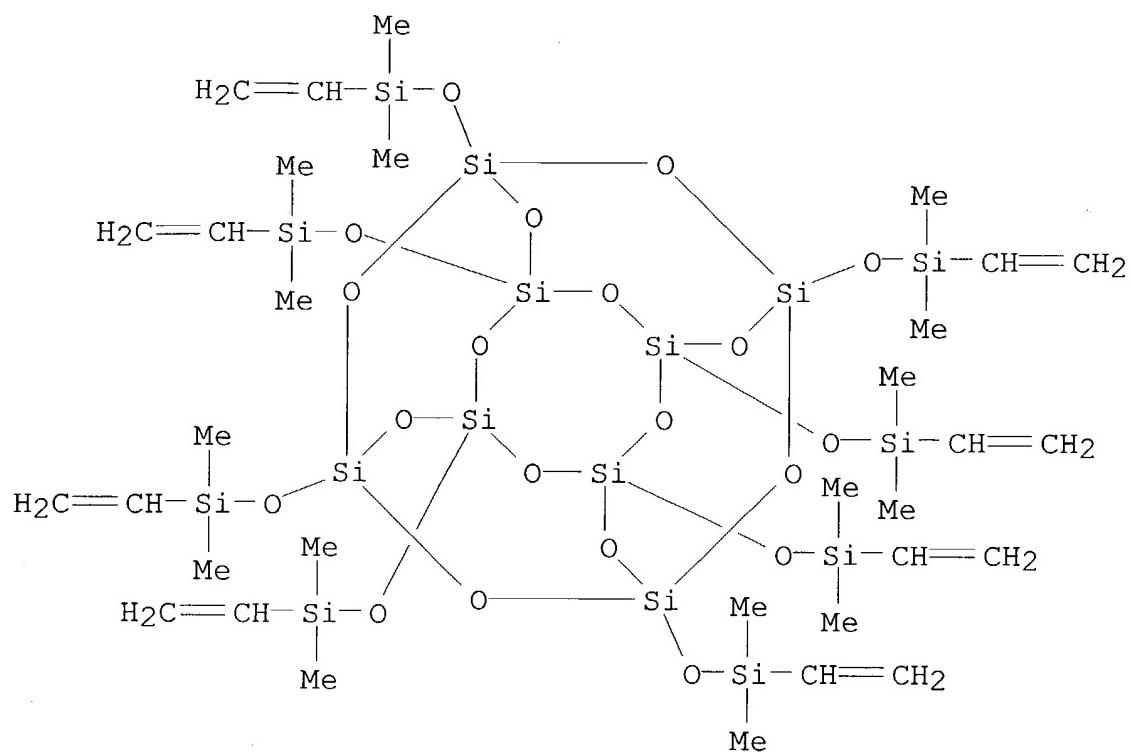
RN 161741-91-9 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane,  
octakis[(ethenyldimethylsilyl)oxy]-, polymer with  
pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane (9CI) (CA INDEX  
NAME)

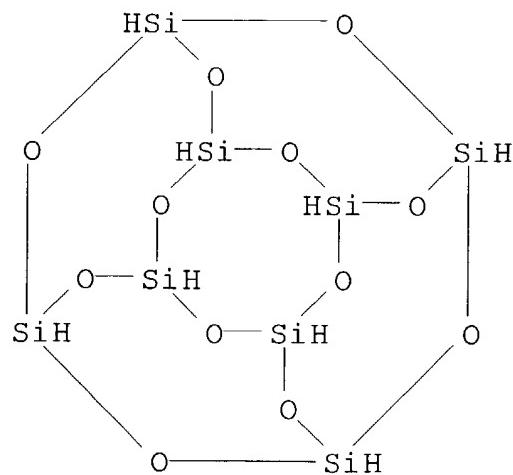
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CRN 126503-69-3

CMF C32 H72 O20 Si16



CM 2

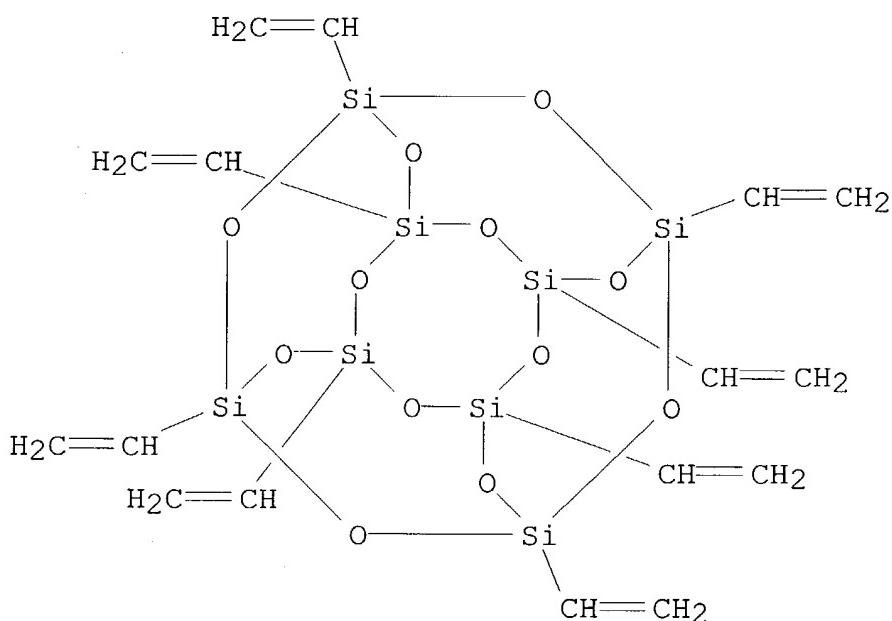
CRN 281-50-5  
CMF H8 O12 Si8

RN 173775-21-8 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, octaethenyl-,  
 polymer with pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane (9CI)  
 (CA INDEX NAME)

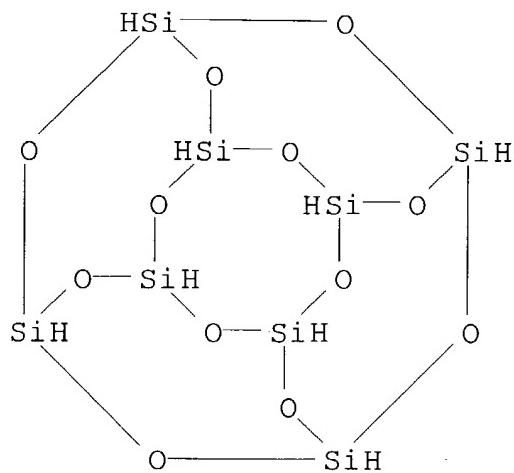
CM 1

CRN 69655-76-1  
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CM 2

CRN 281-50-5  
 CMF H8 O12 Si8



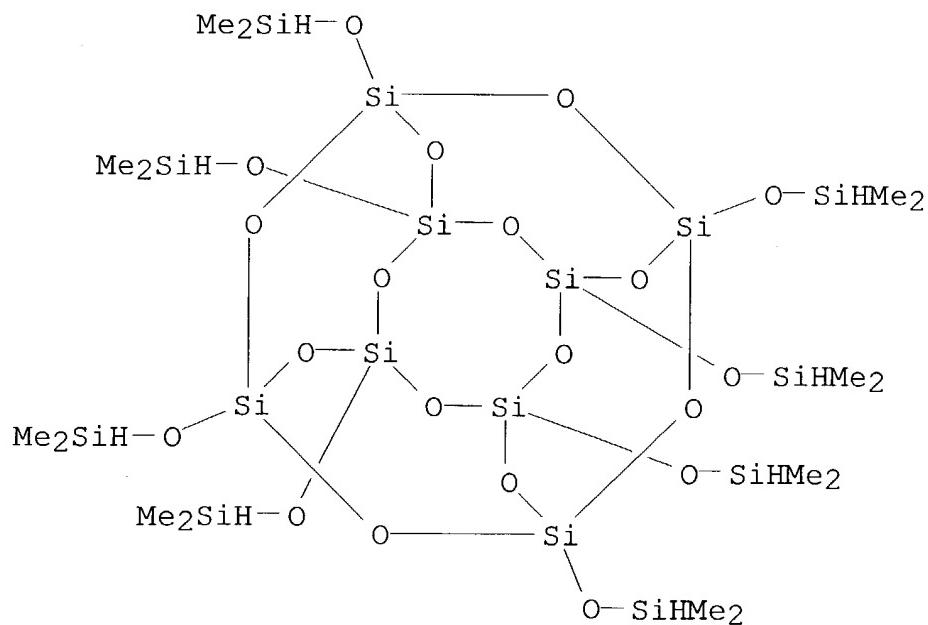
RN 173775-22-9 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane, octaethenyl-,  
polymer with octakis[(dimethylsilyl)oxy]pentacyclo[9.5.1.13,9.15,15,  
17,13]octasiloxane (9CI) (CA INDEX NAME)

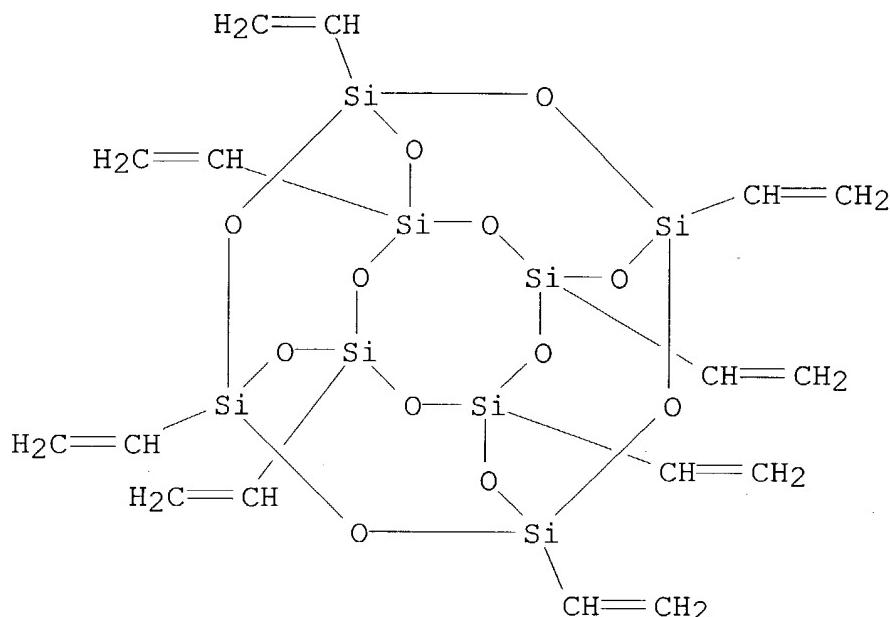
CM 1

CRN 125756-69-6

CMF C16 H56 O20 Si16



CM 2

CRN 69655-76-1  
CMF C16 H24 O12 Si8IT 142468-08-4P 161741-91-9P 173775-21-8P  
173775-22-9P

(prepn. and TGA and DSC characterization of mol. composites from hydrido and vinyl functionalized silsesquioxanes)

L29 ANSWER 30 OF 30 HCA COPYRIGHT 2004 ACS on STN  
 115:72377 Preparation and silicon-29 NMR spectroscopic investigation of polymers with definite silicic acid units. Hoebbel, D.; Pitsch, I.; Heidemann, D. (Zentralinst. Anorg. Chem., Berlin-Adlershof, 0-1199, Germany). Zeitschrift fuer Anorganische und Allgemeine Chemie, 592, 207-16 (German) 1991. CODEN: ZAACAB. ISSN: 0044-2313.

AB Three polymers were synthesized by additive reaction of the cage-like double four-ring (D4R) silicic acid derivs. [Me<sub>2</sub>HSi]<sub>8</sub>Si<sub>8</sub>O<sub>20</sub> and [CH<sub>2</sub>:CHMe<sub>2</sub>Si]<sub>8</sub>Si<sub>8</sub>O<sub>20</sub> resp., with the unsatd. divinyltetramethyldisiloxane or the multiple functional tetramethylcyclotetrasiloxane and polymethylhydrosiloxane, Me<sub>3</sub>SiO(SiHMeO)<sub>25</sub>SiMe<sub>3</sub>, in a molar ratio of functional groups 1:1. By means of <sup>29</sup>Si solid state NMR spectroscopy was shown that the in org. solvents insol. polymers are built up by D4R silicic acid units, which are connected by chain-like or cyclic siloxane bridges. With increasing functional groups of the reactants the steric hindrance of the reaction of D4R derivs. grows. The polymers show small surfaces of 1 to 8 m<sup>2</sup>/g.

IT 135283-06-6P 135283-07-7P  
 (prepn. of)

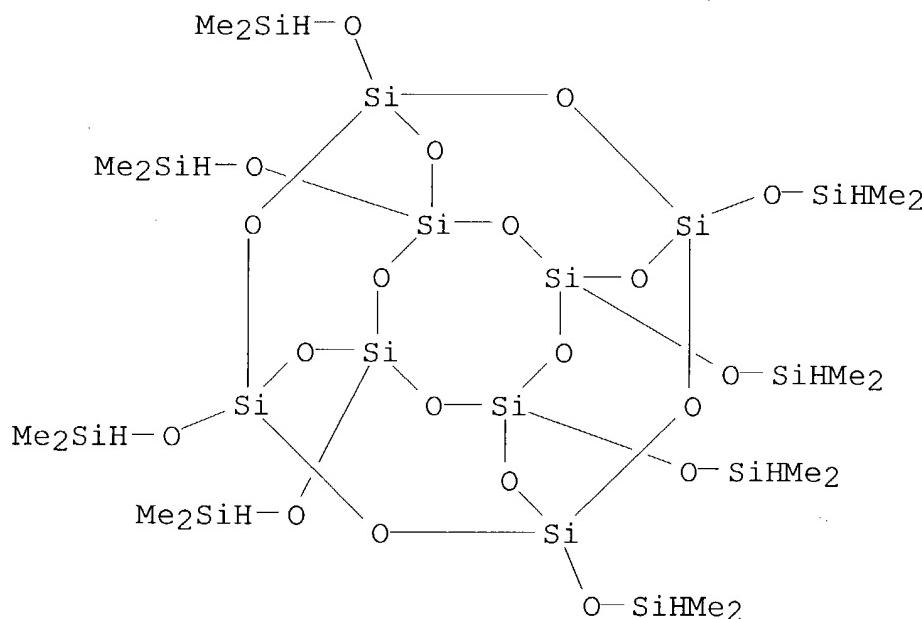
RN 135283-06-6 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane,  
 octakis[(dimethylsilyl)oxy]-, polymer with 1,3-diethenyl-1,1,3,3-  
 tetramethyldisiloxane (9CI) (CA INDEX NAME)

CM 1

CRN 125756-69-6

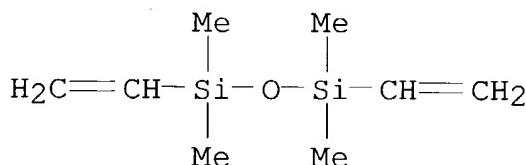
CMF C16 H56 O20 Si16



CM 2

CRN 2627-95-4

CMF C8 H18 O Si2



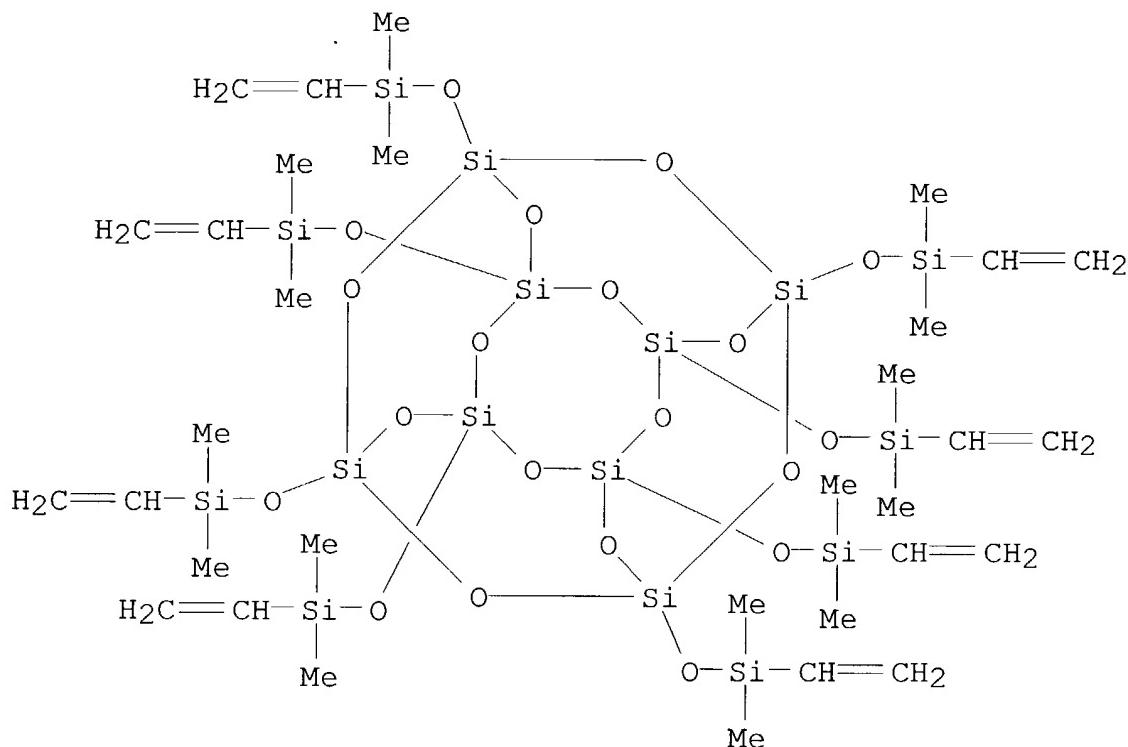
RN 135283-07-7 HCA

CN Pentacyclo[9.5.1.13,9.15,15.17,13]octasiloxane,  
 octakis[(ethenyldimethylsilyl)oxy]-, polymer with

2,4,6,8-tetramethylcyclotetrasiloxane (9CI) (CA INDEX NAME)

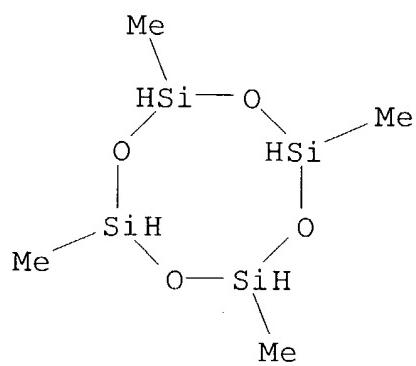
CM 1

CRN 126503-69-3  
CMF C32 H72 O20 Si16



CM 2

CRN 2370-88-9  
CMF C4 H16 O4 Si4



IT 135283-06-6P 135283-07-7P  
(prep. of)